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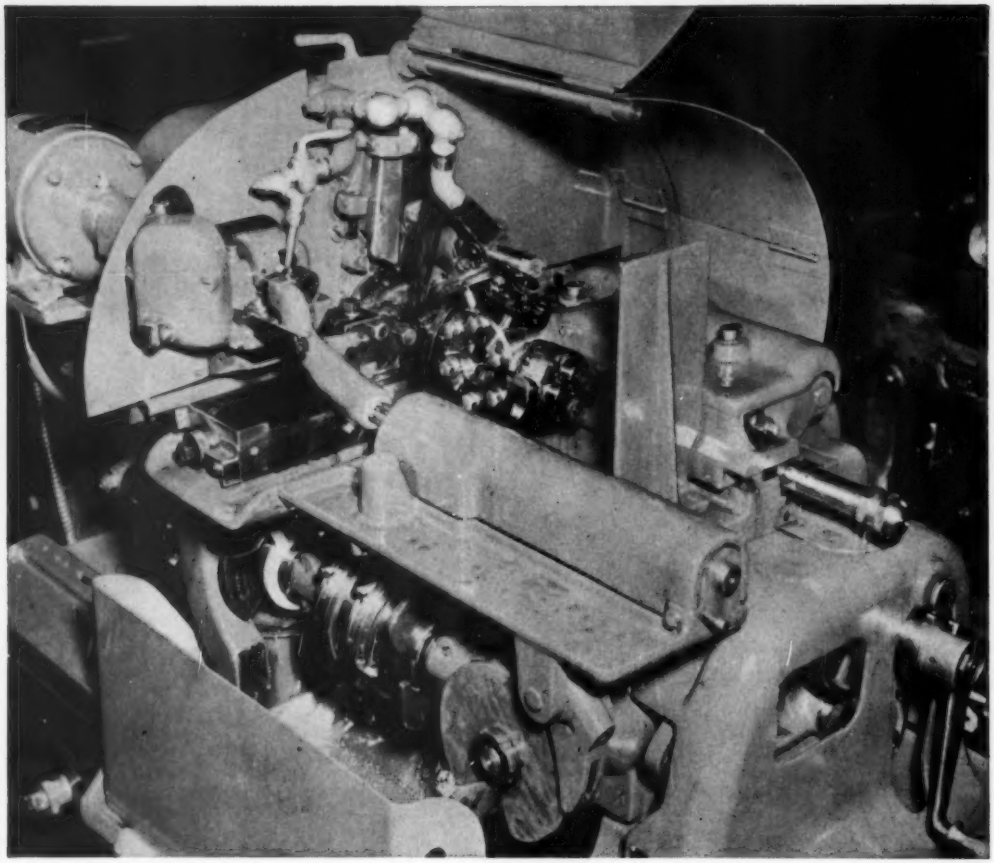


MORE PARTS PRODUCED

. . . because Texaco reduced rejects for this manufacturer*

With the help of Texaco Products and Lubrication Engineering Service, this manufacturer of socket parts was able to maintain uniform hole size, eliminate staining of copper, and get triple the life from his drills. Naturally, production went up; costs came down.

The example is typical. In *your* plant—wherever located, whatever you make—you, too, can increase production, reduce waste and costs with Texaco.

Call in a Texaco Lubrication Engineer today.

*Name of this Texaco user on request

MORE THAN 2,000 Texaco Distributing Plants in 48 states. Call the nearest one or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO

LUBRICANTS, FUELS AND LUBRICATION ENGINEERING SERVICE

Only with B. F. Goodrich grommet belts can you make these savings!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

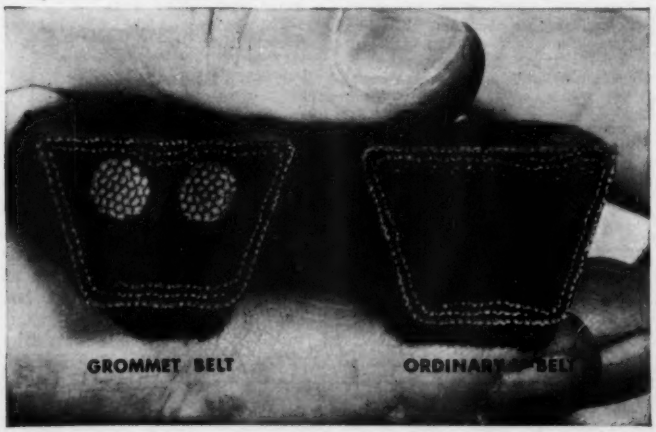
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. PE-7
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

State_____

USE

Koiled Kords

ON

ELECTRICALLY OPERATED

PORTABLE TOOLS... MACHINES THAT MOVE

See how Koiled Kords eliminate dangling, catching, kinking cords on this job. Look over your plant and see the many places you can use these retractile kords that extend to five times their retracted length.

Jacketed in long-wearing neoprene, Koiled Kords may be ordered in standard lengths or made to your specifications.

Write for Koiled Kord bulletin showing their many uses.

IN STRAIGHT CORDS

DYNAPRENE IS BEST

Where retractile kords are not required use DYNAPRENE straight cords. DYNAPRENE is tough and resistant to abrasion, light, grease and other destroyers of older type cords.

Be sure to specify Whitney Blake type SO or SJO for flexible cord satisfaction.

Write for descriptive DYNAPRENE bulletin.

Koiled Kords

Box K New Haven 14, Conn.

Canadian Koiled Kords Distributor: R. D. Fleck & Co. Ltd., Oshawa, Ont.

'ROUND ABOUT with the editors in field and office

Industrial Workers Were a Lot Safer in 1950

INDUSTRIAL INJURY RATES for 1950, as reported by the National Safety Council, show a substantial reduction in both the frequency and severity of 1950 accidents as compared with those of 1949.

The accident frequency rate, based on the number of disabling injuries per 1,000,000 man-hours, was 9.3 in 1950—a reduction of 8 per cent from the year before. The communications industry led all other industries with a rate of 2.05; aircraft manufacturing ranked second with 4.17; followed by the electrical equipment industry with 4.28 and steel with 4.63.

Lumbering stayed at the bottom of the frequency list with a 46.85 rate; coal mining was next with a 43.64 rate; mining other than coal was third from the bottom with a 25.83 rate.

The accident severity rate for all industries, based on the number of days lost per 1,000 man-hours, was .94 for 1950—a reduction of 8 per cent from 1949. Communications had the lowest severity rate of .12; service industry was second with a rate of .19; tobacco industry was third with a rate of .23.

In terms of severity, coal mining was at the bottom of the list with a rate of 7.91; lumbering was next to last with 4.79; mining, other than coal, was third from the bottom with a rate of 3.25.

For Southern California Readers

FOR THOSE fortunate enough to live in Southern California's sunny clime we would like to draw attention to a very active group, the Electrical Maintenance Engineers Association of Southern California. Several types of membership are available, but active membership, with dues of $5 a year, is limited to people regularly and actively engaged in the design, installation, maintenance and operation of electrical or allied equipment and appliances.

The meetings of the EMEA are scheduled for every third Wednesday of the month. At one of their meetings Gordon E. McIntyre, of Dow Corning Corp., was guest speaker. He spoke on the subject, "Stretching the Maintenance Dollar with Silicones." The Executive Secretary is Marion Allen and the address of the Association is Room 511, Architect's Building, 816 West Fifth St., Los Angeles 17, Calif.

News About the Plant Engineers Clubs

New York: The season's Grand Finale of the Plant Engineers Association of New York was held on May 8, at the Ruppert Brewery, 1639 Third Ave., New York City. They had an excellent attendance of 32 people, members and guests. During a short business meeting the new officers for the 1951-52 season were elected. H. J. KNELL, of Wright Aeronautical Corp., is the new president, and L. B. WOOLFENDEN, of General Aniline and Film Corp., is the new secretary-treasurer.

Harold Travis introduced the guest speaker of the evening, Rear Admiral William S. Maxwell (ret. U.S.N.) Associate Director, Bureau of Smoke Control, City of New York, who gave an interesting talk on smoke abatement with reference to the city code. He also discussed some vivid information on the effects of the atom bomb after explosion, based upon Navy tests.

The next meeting will be announced in the fall by the new secretary.

(Continued on page 126)

Would You Like to Be an Editor? We Need Another on Our Staff!

THERE IS an opening on the Plant Engineering editorial staff for a young man of around 30 yr of age who has a good personality and common sense and who likes to meet people, travel and write. He does not have to be a gifted author but must be able to write clear and concise English. He should have: an engineering education; at least 4 to 6 yr practical experience as a plant engineer; and, if a veteran, preferably service as post engineer or in air corps maintenance. If you qualify and are interested write (strictly confidential) The Editor, PLANT ENGINEERING, 110 So. Dearborn St., Chicago, Ill.

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.66 P. L. & R. authorized by Post Office.

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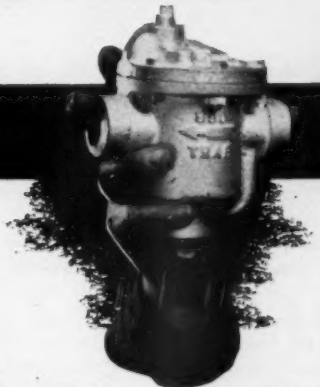
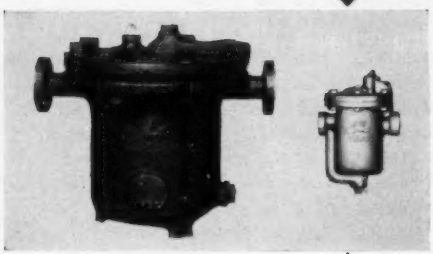
IN A SMALL PACKAGE

...buy Armstrongs

SIZE FOR SIZE
THEY GIVE YOU MORE





FROM THE RIDICULOUS TO THE SUBLIME . . . **The monstrosity on the left is a steam trap once manufactured in Germany. It weighs 116 lbs. but has no more capacity than the 10½ lb. Armstrong trap on the right. All of which is a means of focussing your attention on the importance of a steam trap leverage system. The size of the big trap is necessary due to its crude-by-comparison leverage design.**

ARMSTRONG steam trap capacity is a bargain size for size because of the patented leverage system. In an Armstrong trap for 100 psig, leverage is higher than in one for, say, 15 psig. Thus, a larger valve can be opened than would be possible if the leverage was the same for all pressures.

That sounds simple, but isn't. If higher leverage is secured with a longer lever arm, a bigger trap body is needed. That's the trouble with the elephant shown at the left. Also the design must permit the valve to open *wide* or it will restrict the orifice, reducing capacity. *Armstrong's design answers these problems better than any other design.*

P. S. When comparing traps be sure capacities are based (as are Armstrongs) on *actual* tests with condensate at steam temperature. No other basis is reliable. ARMSTRONG MACHINE WORKS, 912 Maple St., Three Rivers, Michigan.

SEE OUR CATALOG IN SWEET'S

The 36-PAGE STEAM TRAP BOOK gives dimensions, weights and actual capacities of Armstrong traps. Write for a copy or Call your local Armstrong Representative.

ARMSTRONG STEAM TRAPS

take this view

Of Your Plant's Electrical System

Distributing electrical power to operate your plant is more than just wiring between transformers and equipment.

The electrical distribution system's flexibility, service continuity, regulation, and efficiency can have a decided effect on your operating economy. There is no all-purpose system to balance these factors . . . to best meet all your needs. That's why it's imperative that your plant have a modern distribution system specifically planned to meet *your* individual requirements.

Power centers provide the simplest way—the low-cost way—of attaining the system you require. Westinghouse Indoor Dry-Type Power Centers also give you these advantages:

THEY COST LESS TO MAINTAIN—no liquids to test, recondition or replace . . . no gaskets, valves or gauges. All parts are readily accessible.

THEY'RE MORE ECONOMICAL—because they eliminate the need for costly vaults and can be located near center of load . . . resulting in shorter secondary circuits, lower line losses, better regulation.

THEY'RE SAFER—from the hazards of fire and explosion; they have no exposed live parts. Breakers and switches have positive interlocking mechanisms, each in its separate compartment.

Your Westinghouse Representative will be glad to discuss your system problems with you. He is prepared to offer complete system information, with advantages of each carefully weighed. Ask him for Booklet B-4045, *"Industrial Plant Distribution Systems"*, B-4162, *"Power Centers by Westinghouse"*. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60731

PRIMARY SELECTIVE RADIAL SYSTEM

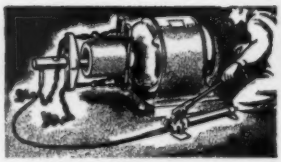
Low operating and maintenance costs, with moderate initial expense, make this system excellent for installations where the requirements for flexibility, and service continuity are average. To evaluate this system in terms of your requirements, consult your Westinghouse Representative.

Westinghouse

POWER CENTERS

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

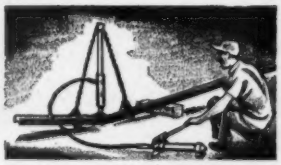
1,001 ways to lick

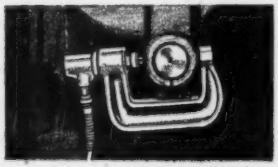


LIFT **LIFT MACHINERY** — Raise from a low of 1¼". Save up to 9 man-hours or more in moving and resetting a machine with this hydraulic "Porto-Power" toe-lift setup.

PULL **FASTER REPAIR WORK** — Standard attachments quickly harness the ram to pull with FULL power. Pull wheels, gears, pulleys, bearings. No prying or sledging.

PRESS **SOLVE OPERATING PROBLEMS** Need a press on an assembly job? Just mount the "Porto-Power" ram in a home-made press or a standard "Porto-Power" bench press. Ram easily removed.





CLAMP **NEW ZIP IN MAINTENANCE**—Clamp parts for welding, riveting or other operations. Combinations build up for short or long spaces—for work at *any angle*.

BEND **SPEED UP CHANGE-OVERS** — Bend monorail, straighten shafts, bend conduit. Apply hydraulic power how, where and when you want it!

PUSH **PREVENT SHUTDOWNS** — Push out pins, bushings, etc., the fast way — with this or other versatile "Porto-Power" combinations and setups.

"Porto-Power" is *no ordinary* hydraulic jack. It's vastly different — *first* because it exerts full power at *any angle*. And, *second*, it does a whale of a lot more than lift! That's because the compact, remotely-operated ram is *threaded* for fast assembly with ingenious "Porto-Power" attachments . . . to push, pull, clamp, press, bend or spread.

Man-Alive! this Hydraulic Jack DOES EVERYTHING but walk and talk!

Maintenance, Repair, Operation headaches

"So inexpensive — yet so valuable . . . I don't know how we ever got along without it!" That's the way thousands of plant operating men feel about "Porto-Power." And today's pressure of defense work and expanded production now make this remarkable hydraulic equipment even more *essential.* It speeds up plant conversion dramatically . . . cuts maintenance costs . . . prevents shut downs . . . solves production problems the easy way . . . and conserves valuable manpower on job after job.

See how "Porto-Power" offers 1001 *short cuts!* Get full facts on this complete line of *portable* hydraulic equipment. Rams are available in 2, 4, 7, 10, 20 and 50-ton capacities . . . with hand-operated or motor driven pumps . . . plus scores of work-saving attachments for maintenance, production or laboratory work. Ask your Industrial Supply Distributor for literature or write Blackhawk Mfg. Co., Dept. P4971, Milwaukee 1, Wis.

S31 KIT

This popular ass't of "Porto-Power" attachments includes a "Porto-Power" Jack that exerts 10 tons of push, pull, clamp, press, bend, spread or lift. No maintenance crew can afford to be without it.

S79 KIT

For rugged jobs that need 20-tons of "Porto-Power" action on a push, pull, spread, bend or lift. Pays for itself on one or a few good assignments.

1st Choice for hydraulic power in **Maintenance Repair Operation**

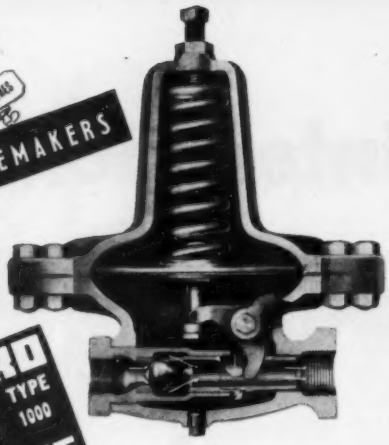
PORTO POWER IS PROFIT POWER

ONLY BLACKHAWK MAKES Porto-Power

GET RID OF THESE TROUBLEMAKERS

Many Businesses Do by Installing the . . .

CASH STANDARD Streamlined PRESSURE REDUCING VALVE TYPE 1000



Check THE NUMBER BEFORE EACH OF THE FOLLOWING USER'S STATEMENTS AGAINST THE 10 POINTS LISTED

1. A manufacturer checks 6 of the points and says, "Installed the '1000' on our fuel burning equipment and HAS GIVEN ENTIRE SATISFACTION."
2. A chemical company checks 6 of the points and says. "We have operated two of your CASH STANDARD Streamlined Type '1000' Pressure Reducing Valves in our plant for eighteen months with NO MAINTENANCE OR ADJUSTMENT REQUIRED."
3. A lumber company checks 3 of the points and says, "We use this valve to REDUCE THE PRESSURE from our boilers to the office where we use this steam from the boilers to heat the office. We have USED THIS VALVE FIVE YEARS and it has NEVER GIVEN ANY TROUBLE."
4. A machine works checks 9 of the points and says, "We have had NO TROUBLE with the '1000' valves now in use on our preloading unit.".
5. A laundry checks 7 of the points and says. "It is a GOOD TROUBLE-FREE, TIGHT CLOSING, COST-SAVING VALVE with PRACTICALLY NO MAINTENANCE."
6. A meter manufacturer checks 4 of the points and says, "Valve used in Research Dept. for VARIOUS TEST PRESSURES THAT MUST BE MAINTAINED regardless of upstream pressure changes."
7. A boiler and tank company checks 9 of the points and says. "We have in operation many CASH STANDARD Type '1000' Streamlined Valves and are pleased to state their PERFORMANCE HAS BEEN SATISFACTORY AT ALL TIMES."

1	2			5		7	POINT No. 1 Maximum capacity when needed most.
1	2		4		6	7	POINT No. 2 Accurate pressure control under toughest working conditions.
1	2	3	4	5	6	7	POINT No. 3 Trouble-free service.
1	2	3	4	5	6	7	POINT No. 4 Smooth operation.
1	2		4	5		7	POINT No. 5 Tight closure.
			4	5			POINT No. 6 Speedier production results.
			4	5		7	POINT No. 7 Elimination of failures.
			4	5		7	POINT No. 8 Cost-saving operation.
			4	5		7	POINT No. 9 No spoilage.
1	2	3			6	7	POINT No. 10 Practically zero in maintenance.

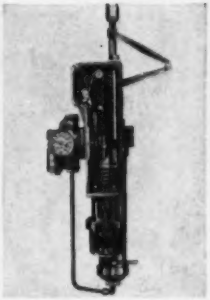
Write For Bulletin 962

CASH STANDARD CONTROLS.. VALVES

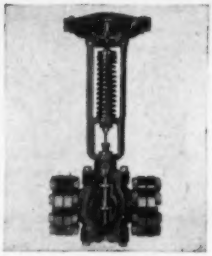
A. W. CASH COMPANY
DECATUR, ILLINOIS

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

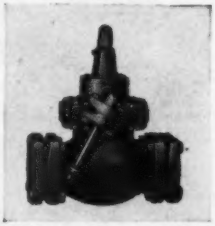
Send for them



Bulletin 963 features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers — various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.



Bulletin 968 features the CASH STANDARD Type 34 Pressure Reducing Valve — direct operated — direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.



Bulletin 956 features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

A *Good* waste-treatment system...

costs *far less* than you think!

HERE'S HOW ONE MAN LEARNED THIS FACT:

A paper manufacturer, faced with the problem of waste treatment in his plant, guessed that a good system would cost him a six-figure sum. To avoid paying so high a price, he sunk a considerable amount into a home-made system—which simply did not do the job. And so he called in consulting engineers.

After making a complete survey of the mill, analyzing samples of its waste, and thoroughly studying the problem, the engineers made their recommendations. They were accepted by the surprised manufacturer, and the system was built.

The waste-treatment plant cost *even less* than the supposedly-cheap makeshift equipment that had failed, and it provided an effluent completely acceptable for re-use in the mill.

It also produced some benefits the manufacturer never expected:

- **A large amount of raw stock was recovered**
- **Stream pollution was eliminated**
- **There was an important reduction in heat losses**

The manufacturer estimates the new system will have paid for itself within three years!

Maybe *you* have been putting off the question of water, sewage, or industrial waste treatment for your plant or community because you think the cost prohibitive. Don't guess; you will probably be wrong! *Call in consultants specializing in this field.*

FREE BOOKLET

FOUR WAYS TO ECONOMIZE ON INDUSTRIAL WASTES

...is a factual treatise offering much useful information on its subject. Write for your copy today! Address: Gilbert Associates, Inc., 412 Washington St., Reading, Pa.

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NEW YORK • PHILADELPHIA • WASHINGTON • HOUSTON • ROME • MANILA • MEDELLIN

INCREASE PRODUCTION NOW...

WITH **Present Plant Manpower**

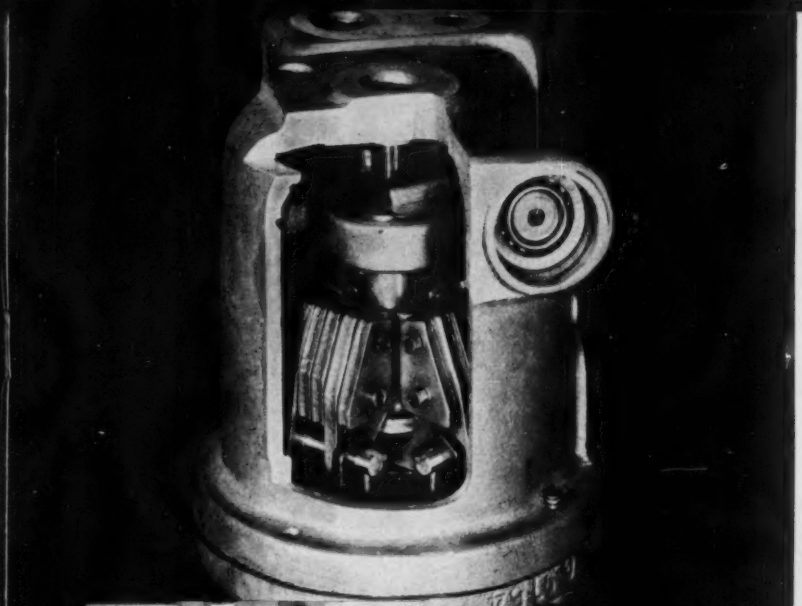
Present Plant Space

The next time you walk through your plant, cast your eyes toward the ceiling and you'll realize that there is mighty valuable space that can be put to work—without increasing your plant capacities and without increasing plant manpower.

An American MonoRail engineer will show you how you can use your "air rights". With thousands of overhead handling installations from which to draw, each with many money and time saving advantages, it will pay you to investigate American MonoRail Overhead Handling Systems. Send for bulletin C-1.

THE AMERICAN MONORAIL COMPANY

13123 ATHENS AVENUE **CLEVELAND 7, OHIO**



Cut-away view of factory-lubricated Pierce torque converter transmission governor.

Left to right: F. C. Hess, Standard Oil lubrication specialist, W. E. Benjamin, Pierce Governor Company engineer, and A. C. Gartley, Standard Oil Lubrication Engineer, discuss vital part played by STANOLITH Grease in pre-lubrication of Pierce governors.

Elected for governor job . . .

TO INSURE trouble-free lubrication of their product in the field, officials of Pierce Governor Company, Inc., Anderson, Indiana, initiated the production of a factory-lubricated sealed unit type governor.

A special grease was found that did the job, but as production of the sealed units mounted, this grease became a costly production item. That's when STANOLITH Grease, recommended by a Standard Oil Lubrication Specialist, was tried. In test block runs simulating 10,000 hours of actual operation, at speeds ranging up to 4,000 RPM and temperatures from 150°F. to 200°F., STANOLITH did an even better job than the original lubricant.

STANOLITH factory-lubricated governors now have been in service for over eight months with no troubles resulting from bearing failures, overheating, or leakage of the lubricant. STANOLITH's lower cost has been an added advantage.

STANOLITH
TRADE MARK
Greases

This is one of many success stories reported by users of STANOLITH. For the beginning of your own lubrication success story, call your local Standard Oil (Indiana) office for the services of a lubrication specialist.

Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.

What's YOUR problem?

F. C. Hess, of Standard Oil's Indianapolis, Indiana, office, is the Standard Oil lubrication specialist who recommended STANOLITH to operators of the Pierce Governor Company, Inc., enabling them to make an appreciable cut in production costs.

Throughout the Midwest there is a corps of specially trained, experienced lubrication specialists ready to give you prompt, on-the-spot help with any lubrication problem. Each of these men has been carefully trained in a Standard Oil Lubrication Engineering School. It's easy to get the services of a lubrication specialist — just phone or write to your local Standard Oil Company (Indiana) office. When he stops by to see you, ask him about the following fine Standard products:

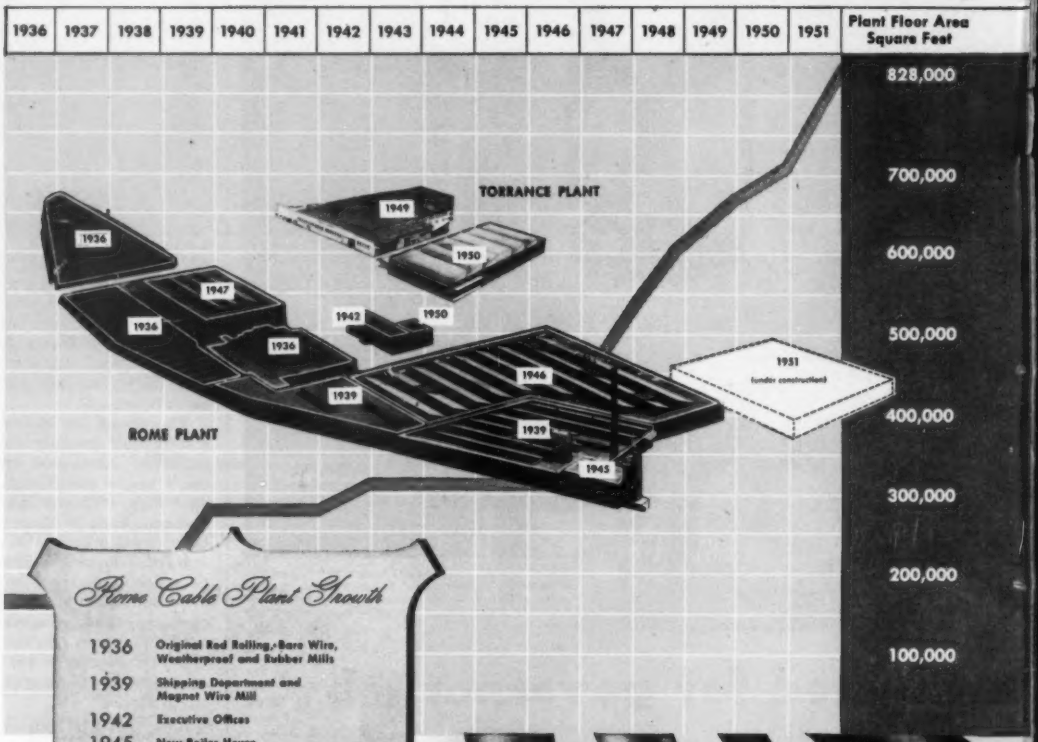
STANOIL Industrial Oils—This general-purpose line of oils provides cleaner operation of hydraulic units and supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears, better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUSTs form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically developed for its intended use. The grades range from a fingerprint remover to a heavy petrolatum that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY (INDIANA) STANDARD

1936 - 1951



Rome Cable Plant Growth

1936	Original Rod Rolling, Bare Wire, Weatherproof and Rubber Mills
1939	Shipping Department and Magnet Wire Mill
1942	Executive Offices
1945	New Boiler House
1946	New Rubber Mill, Research Laboratories, Cafeteria, Medical Department
1947	New Bare Wire Mill
1949	Steel Tubing Mill
1950	Additions to Executive Offices Rigid Steel Conduit Mill
1951	New Plant for Military Production (under construction)

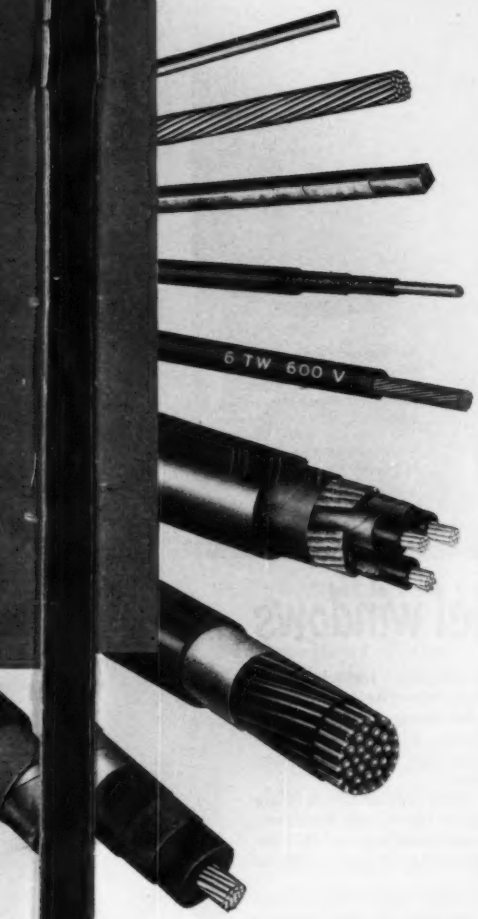
FROM BAR TO FINISHED WIRE... FROM SHEET TO FINISHED TUBE

In the manufacture of wires and cables, as well as steel conduit, control of Rome Cable quality is a step by step process. Starting with basic forms .. copper wire bars and sheet steel . . . Rome Cable products are manufactured entirely within its own plants. Equipment of the latest design, capable research and engineering, plus rigid inspection assure you of uniformly high quality.

Rome Cable offers, also a *personalized service* . . . based upon intimate contact between buyer and seller. Strategically located sales offices and warehouses across the nation bring Rome Cable as close to you as your telephone. In this period of defense priority, material shortages are acute and delivery requirements cannot always be met. You can depend, however, upon Rome Cable doing its best and when it cannot, honestly saying so.

Write today for your complimentary copy of the attractively bound book, "The Story of Rome Cable Corporation," and learn more about Rome Cable's facilities.

. . . You've Helped Rome Cable Make The Years Count



Fifteen years ago this July, we made our first shipment of wires and cables to the electrical industry. Your ready acceptance of Rome Cable products since that time has more than justified our confidence in that first shipment.

Today, electrical power surges through Rome wires and cables of many types, in many places . . . powering vital industry, lighting cities, safeguarding life, bringing convenience and comfort to homes throughout the land.

Burrowing deep for vital minerals, carrying heavy power loads from city to city, turning the wheels of the nation's industry . . . Rome wires and cables are unfailingly at work.

When the farmer flips his barn switch for that 4 A.M. milking . . . when a hundred and one electrical conveniences are called into use . . . Rome wires and cables are at work.

When television gives you a ringside seat, when an electric mixer whips up a cool summer drink . . . or, a neon sign steers you toward a highway hamburger . . .Rome wires and cables are at work.

Yes, even when a telephone voice directs an artillery barrage into Korean hills . . . the vital thread of communication may well be a Rome product. For, today Rome Cable is, again, producing for defense.

So, for fifteen years Rome Cable has steadily grown in meeting your ever-increasing needs. Rome research and engineering have designed better cables, have maintained dependable, high quality . . . *to give you of the electrical industry only the best.*

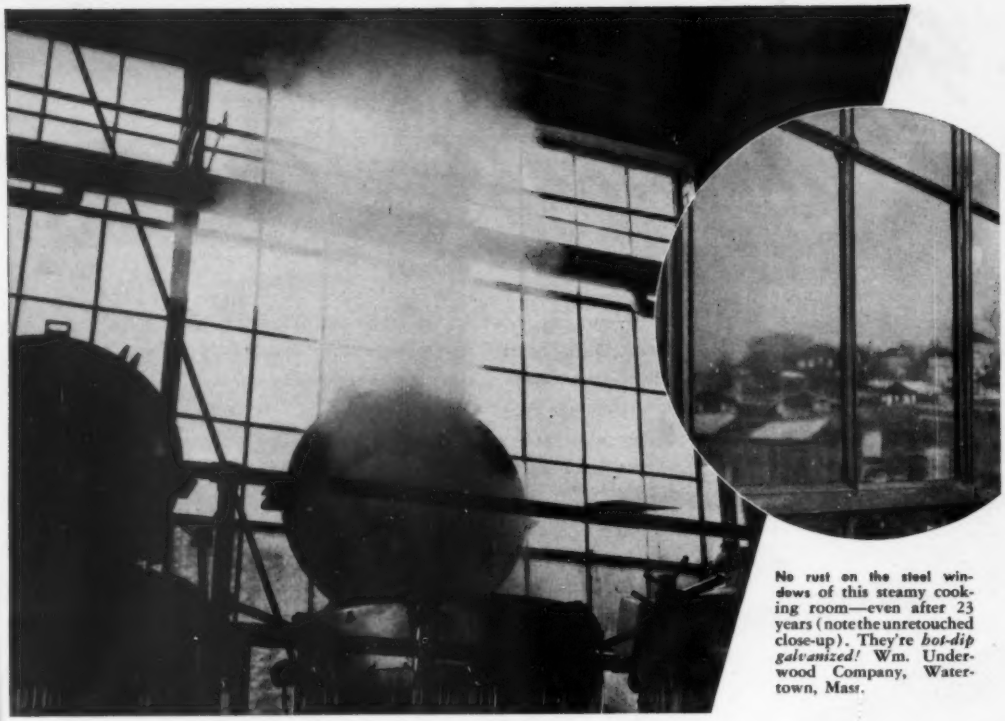
At this milestone in our progress, we, again, dedicate our future to ever higher quality of product and the desire to serve *you who have made these years count.*

ELECTRICAL CONDUCTORS AND STEEL CONDUIT
OF *BETTER QUALITY*

It Costs Less To Buy the Best

ROME CABLE
Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

ROME CABLE ROME, N.Y.



No rust on the steel windows of this steamy cooking room—even after 23 years (note the unretouched close-up). They're *hot-dip galvanized!* Wm. Underwood Company, Watertown, Mass.

Even 23 years of steam didn't rust these steel windows

Those cooking caldrons spew out steam and soak the air with water. And back in one corner pans are washed with a steam hose.

Yet these steel windows in the Wm. Underwood Company, canned food producers, have not rusted in *23 years.*

Why? They were *hot-dip galvanized!*

Now here's the *really* big news! Fenestra* Engineers have developed a new hot-dip galvanizing system that does an *even better* job—and they've built a special new plant around it, the only plant of its kind in America. It has special tanks, special automatic controls—everything especially designed to give you the most *permanent, maintenance-free* windows made.

Galvanizing is done *after* assembly of window frames and assembly of ventilators (and after cleaning, rinsing, fluxing and drying)—so that every bit of exposed metal gets a locked-on protective coating. To make sure the zinc coating is uniform, windows are hung from a unique conveyor that completely immerses them in molten zinc in one deep dip. Then withdraws them at controlled speed.

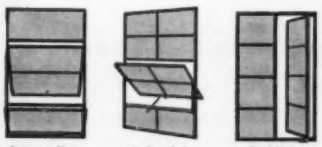
Then the windows dip into the Bonderizing tank. Bonderizing gives them an attractive appearance and prepares the surface for immediate decorative painting if you *want* to paint them.

Check on these windows today. *Steel-strong windows made to STAY new* put real meaning in the term "maintenance free!" Call your Fenestra Representative (he's listed in the yellow pages of your phone book) or write to Detroit Steel Products Company, Dept. PE-7, 2280 E. Grand Blvd., Detroit 11, Michigan. *®

Steel-Strong Windows made to STAY new

Fenestra

HOT-DIP GALVANIZED STEEL WINDOWS



Intermediate Industrial Residence

Are you blast-cleaning the costly, old-fashioned way?

VACU-BLASTER, THE ONLY BLAST CLEANER WITH A VACUUM PICK-UP

Vacu-blaster eliminates costly shut-downs for cleaning, leaves no mess to clean up, actually pays for itself in time and labor saved. Van Camp Sea Food Co. reports: "The savings of one year's cleaning of retorts will alone repay us the amount we have invested in your equipment." Central Valley Pipe Co. says: "A labor saving of $1000 per month over our former method."

Vacu-Blaster is the revolutionary new way to blast-clean metal, wood, concrete, brick...tanks and tank cars, inside and out ...floors, walls and ceilings. It strips rust and paint from ships and vehicles... edge-cleans sheets prior to welding. Vacu-Blaster actually reclaims and re-uses abrasive, lets no flying dust, dirt or abrasive escape to contaminate product or damage machinery.

Operators need not wear masks or protective clothing. Welders and painters can work right alongside Vacu-Blaster. It is portable—can be moved to any job.

Hundreds of satisfied users. Mail coupon for details about patented Vacu-Blaster—the only blast-cleaner with a vacuum pick-up.

DEMONSTRATION CAN BE ARRANGED!

2260

Write for FREE BOOKLET!

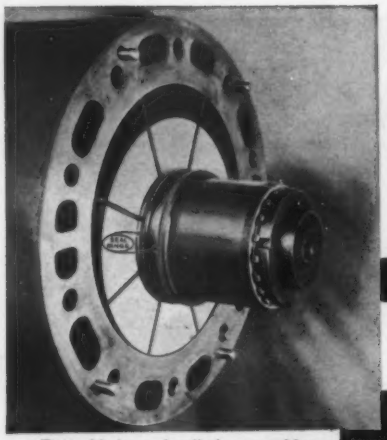
Vacu-Blast Co., Inc., 572 Peninsular Ave., San Mateo, Calif.

We would like your free Vacu-Blaster catalogue____ Wish to arrange for demonstration____ Our problem is_____

Name_____ Position_____

Company_____

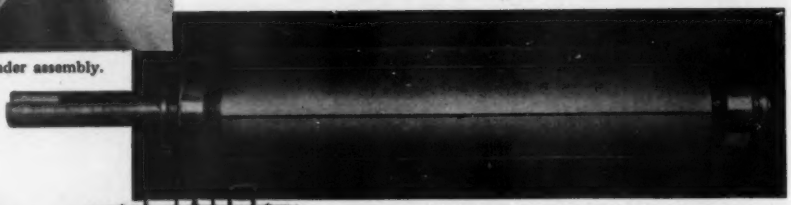
Address_____



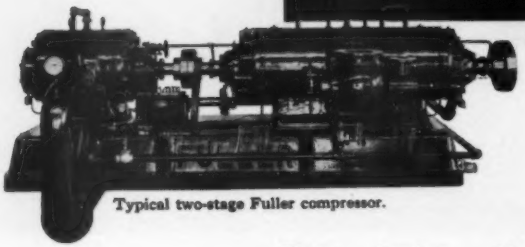
Rotor blades and cylinder assembly.

a lot of maintenance men have never seen inside a

FULLER COMPRESSOR



Accurately balanced, steel rotor with bearings mounted.



Typical two-stage Fuller compressor.

Rotor . . . bearings . . . blades—the only moving parts in a Fuller Rotary Compressor. There you have the three reasons why these compressors keep out of the repair shop. Fuller's efficient "heart" is your guarantee of economical and dependable service.

These are some of the important advantages of the Fuller Rotary—the reasons why thousands of these compressors are quietly and efficiently working for industry today: steady flow—no air-line pulsations, no valves to leak, direct drive from electric motor or internal combustion engine, simple foundation and small floor space, **maintained** capacity and efficiency for the life of the machine.

Whether your requirements call for a single-stage, two-stage or duplex combination, Fuller has the compressor **(to 125 psi. and 3300 cfm)** that will do the job better—longer. Investigate the Fuller Rotary Compressor. Complete information is given in Bulletin C-5. It's yours for the asking.

Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS • COMPRESSORS AND VACUUM PUMPS FEEDERS AND ASSOCIATED EQUIPMENT

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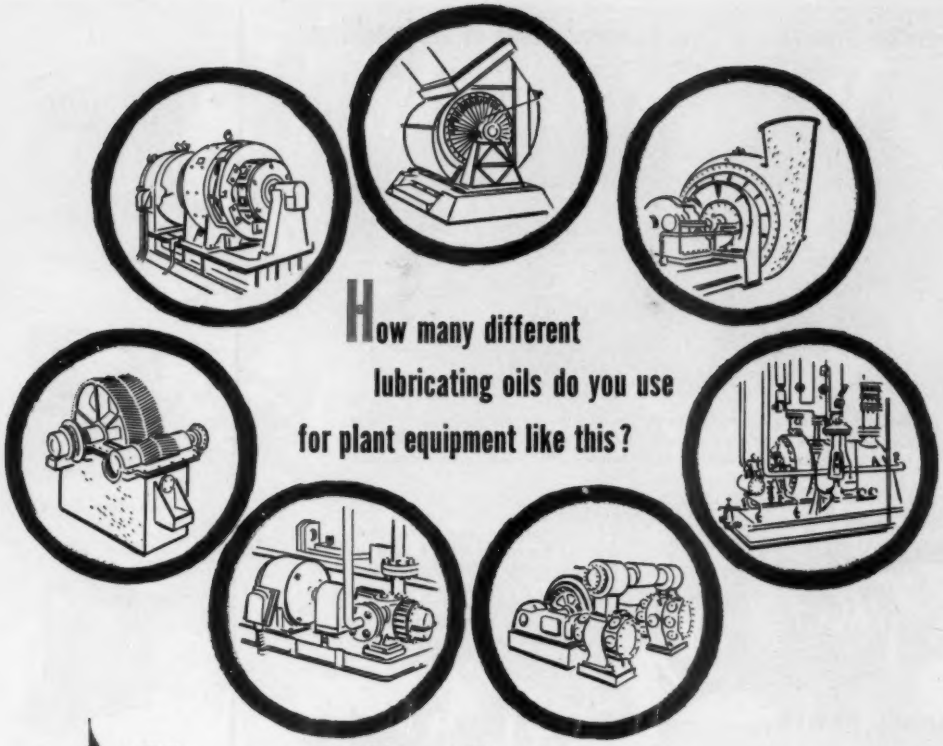
C-217



How many different lubricating oils do you use for plant equipment like this?

You need only one—

GULF HARMONY OIL

the outstanding many-purpose lubricant

for: Motors and Generators · Fans · Blowers · Pumps · Compressors · Hydraulic Mechanisms · Gear Units

Gulf Harmony Oil is a top quality many-purpose lubricating oil, ideal for sleeve-type bearings, oil-lubricated ball and roller bearings, hydraulic systems, compressor cylinders, and many types of gears.

Because of outstanding oxidation stability, Gulf Harmony Oil has exceptional resistance to sludging. In force-feed circulating systems, oil reservoirs, hydraulic lines, and antifriction bearings, the use of Gulf Harmony Oil helps prevent harmful deposits, insures fewer oil changes.

Gulf Harmony Oil provides a protective film which has preferential wetting characteristics for metal—it displaces moisture, interrupts its corrosive action. Thus Gulf Harmony Oil prevents rust on all oil-bathed surfaces—particularly important in antifriction bearings operating under damp conditions. And it separates readily from water, reducing the possibility of emulsification.

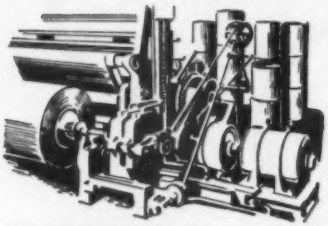
Its high lubricating value means more effective protection against wear under boundary conditions. Available in a wide range of viscosities.

Write today for complete information on Gulf Harmony Oil. Also ask for a copy of the booklet "Gulf Periodic Consultation Service," which tells about Gulf's advanced cooperative service for users of petroleum products. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

American Blower...a time-honored name in air handling

Jacksonville, Fla., has a conveniently located American Blower Branch Office to provide you with data and equipment for air handling. You can reach American Blower in Jacksonville by calling 3-3410. In other cities, consult your phone book.



SMOOTH POWER...

Paper machinery faces these needs: adjustable speed to suit humidity and paper thickness; smooth starting to prevent tearing; no-load starting to keep power costs low. American Blower Gyrol Fluid Drives meet these needs in every respect for a Jacksonville paper company as well as other prominent manufacturers. The complete simplicity of Gyrol Fluid Drive is a great advantage. Speed control is flexible, and the unit is easy to operate.

Rx FOR AIR...

One of the stiffest tests air handling equipment can get is that imposed by manufacturers of pharmaceuticals. Cultures and processes require a sterile atmosphere. Temperature and humidity must often be exact. Recently, an important company in this field selected American Blower Fans and Coils for its main air conditioning system . . . a fine tribute not only to the quality of American Blower products, but also to the effectiveness of our research and testing methods. Why not put this valuable experience to work for you?

EXPERIENCE COUNTS...

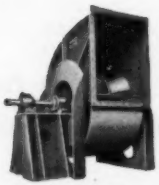
If you're concerned about the air handling requirements in your new defense contract, you'll find American Blower an excellent source for data, equipment, and valuable firsthand experience. For example, the Navy's newest version of the famous Mosquito PT Boat is equipped with American Blower ventilating units.

Whether your needs are civilian or military, American Blower heating, cooling, drying, air conditioning and air handling equipment contributes toward improving over-all comfort and efficiency. For data, phone or write our nearest branch office.

Unit Heaters

Ventura Fans

Air Conditioning Equipment



Industrial Fans

Utility Sets

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

YOUR BEST BUY AMERICAN BLOWER AIR HANDLING EQUIPMENT

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Bring them down with these DAYTON Cog-Belt* "teeth"

- ✓ 40% more h.p. per belt
- ✓ fewer belts
- ✓ fewer pulley grooves
- ✓ longer belt life

Switch to premium Dayton Cog-Belts and watch the cost of power transmission come tumbling down. Original cost is less. 5 Dayton Cog-Belts do the work of 7 ordinary V-Belts.

You save drive space. Cog-Belts let you use up to 25% shorter center-to-center pulley distances.

Cogs are the *only* V-Belts scientifically built to bend, like your finger. They withstand flexing and compression strains better, run cooler, last longer.

To get shut of V-Belt troubles for the duration, to save money and drive space, give your Dayton Distributor the "high-sign" of better V-Belt power transmission: the arched finger that means Dayton Cog-Belts and important savings!

COGS FIX FLATS!

Dayton Cog-Belts converted a compressor drive in a railroad shop, from a flat drive that averaged 6 breakdowns a year, to a trouble-free V-flat drive now going into its tenth year of service. Cogs need no special pulleys, grip so well they convert flat to V-flat with only one pulley change!

DAYTON RUBBER COMPANY • DAYTON 1, OHIO

V-Belts by **Dayton Rubber**

*T.M.

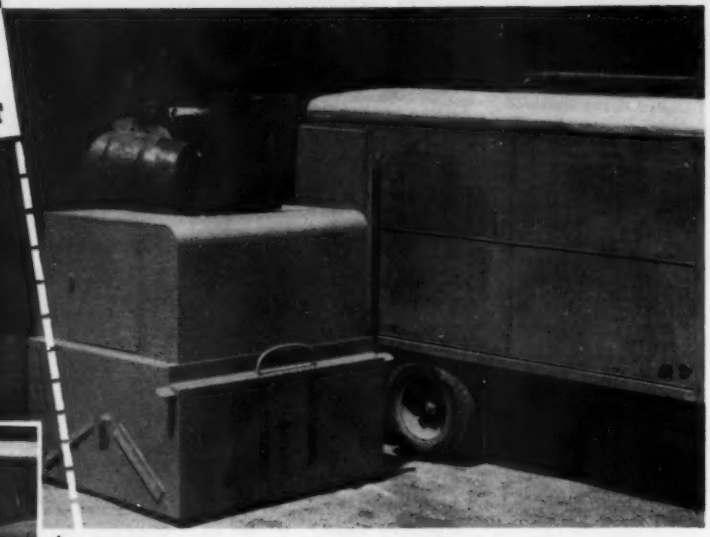
WORLD'S LARGEST MANUFACTURER OF V-BELTS

★

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings



Photos show a Universal Type Container being loaded, Dempster-Dumpster ready to pick it up and place it in carrying position, and container being emptied. Entire operation is handled hydraulically by means of controls at driver's seat.

★

DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

—recognized across the nation

. . . The Dow Chemical Company, well known for sound management, uses the Dempster-Dumpster System

The Dow Chemical Company is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

Increasing man-hour efficiency is one of the important advantages of handling bulk materials with the Dempster-Dumpster System. One Dempster-Dumpster, with only one man, the driver, services any number of detachable Dempster-Dumpster Containers, which are spotted at convenient materials accumulation points inside and outside plants. In this system there are no loading crews to stand idle while truck makes haul, and no re-handling of materials. Dempster-Dumpster Containers are available in a wide variety of designs and sizes, up to 12 cu. yds., to suit the type of materials handled—be they bulky, light or heavy . . . solids, liquids or dust . . . trash or rubbish. The Dempster-Dumpster System also reduces investment in equipment and maintenance costs . . . improves "housekeeping" methods . . . reduces fire hazards . . . and provides an easier, quicker, safer and more efficient manner of handling materials. It will pay you to investigate the Dempster-Dumpster System of plant materials handling now! Manufactured exclusively by Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS - 171 Shea Building - Knoxville 17, Tennessee

ANOTHER NOTABLE ACHIEVEMENT IN SERVICE LITERATURE BY JENKINS

THE NEW
BOOK No. 2
Nos. 26—50

practical piping layouts

The second series of twenty-five basic Piping Layouts (published by Jenkins Bros. in leading industrial, professional, and engineering publications) is now available in booklet form.

If you are among the hundreds of valve-users who received a copy of the first book, or if you saved any of the fifty Jenkins Piping Layouts as they appeared, then you know how helpful this information can be in planning any valve installations.

This new book brings you not only 25 practical piping layouts, arranged in convenient form for quick reference. It also includes a section on the fundamentals of valvé design and application to help you select the type of valves best suited for the service.

Use it as a guide to proper valve selection and placement for longest service life and lowest operating costs. Use it also for an introduction to the wide range of Jenkins Valves for every industrial engineering and plumbing-heating service. You can obtain a copy by requesting it on your business letterhead. Address:

Dept. U, Jenkins Bros., 100 Park Ave., New York 17, N. Y.

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JENKINS VALVES

LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS MARK

Jenkins Bros.

Sold through leading industrial distributors everywhere

THIS SECTION DOUBLES ITS VALUE TO YOU!

Tells "Which valve where, and why"—with information in chart form for quick reference. A compact manual that will be prized by everyone, beginner and veteran alike, who plans piping.

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Treatment of Cooling Water

INCREASED ATTENTION is being focused on treatment of industrial cooling water, due to shortages necessitating maximum re-use of water and limited availability of alloys for cooling systems.

During evaporation period, minerals in the water remain behind, and increase in concentration. Unless proper treatment is provided, hardness in the water coats the heat exchange surfaces with scale which acts as an insulator and lowers efficiency. Water softening by either the zeolite or lime process is widely practiced to eliminate difficulties due to scale.

Prevention of all scale may introduce a different problem—corrosion due to oxygen from the air absorbed by the water in passing through the cooling tower. Copper and stainless steel alloys will resist such corrosion, but critical shortages of these materials during World War II forced many plants to use steel heat exchangers. Means were therefore perfected to protect the steel surfaces against corrosive attack.

One method consists of partially softening the water, and using the remaining hardness to form a thin scale acting as a barrier between the steel and the oxygen. Other methods involve use of chemical corrosion inhibitors or removal of air from the water under a vacuum.

Many variable factors influence selection of cooling water treatment, such as type of water available, heat exchange materials, cooling tower performance, water temperatures and flow rates. Careful study of actual operating experiences at many plants using various treatment methods will help give you the correct answer to your water treatment problem. *From a paper by Durando Miller, The Permutit Co., presented at the Midwest Power Conference.*

Push-Button Communication Center

ORDERS FOR STEEL and other messages essential to production of steel for defense and civilian needs will be flashed from American Steel and Wire Company's headquarters

Supervisor indicates button which will relay message to 148 other stations

in Cleveland to other stations on a 33,000 mile network. This private telegraph switching center will speed the flow of messages daily between 149 U. S. Steel plants and offices in 86 cities. The new center replaces manually controlled center.

Through the new system, each message is typed only once on the typewriter-like keyboard of a teleprinter at the originating point, and flashes to the center. There an operator observes the destination on a perforated tape, touches the proper button, and an electric brain flashes

Heavy Conduit Lowered Without Power Break

ROOM HAD to be made for a new piece of equipment—a strip annealer—which was being received at the Chase Brass and Copper Company's Metal Works Plant at Waterville, Conn. In excavating the spot where it was to be placed, the men discovered eight 4 in. conduits, encased in concrete, which serviced power and light needs in several sections of the huge plant.

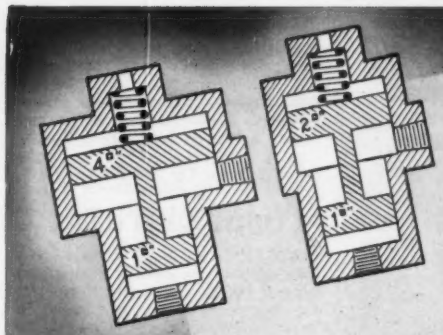
It was found necessary either to lower this conduit 30 in., or reroute it in a new location—at an estimated cost of $10,000 and a delay of several months due to difficulties in obtaining new cable. After discussing the possibilities, it was decided to lower the conduit.

Conduit is securely lashed with heavy wire rope and supported by chain block hoists before being lowered into new place, to make room for strip annealer

After the men had excavated to the proper depth and carefully blocked up the conduit to prevent damage, the crew of the contractor took over and lashed heavy structural beams at 4 ft intervals to the entire length of the conduit. Chain falls were hung from temporarily installed overhead I beams and hitches made to the beams on top of the conduit. Eleven falls of 5 to 8 ton capacity were used, as the over-all weight was approximately 75 tons.

When everything was ready, two men were assigned to each chain falls, one to operate the falls and the other to watch the gauge. At a signal from the foreman each man operated his falls so that the conduit was lowered in increments of ½ in. uniformly throughout its length. The entire lowering operation took about three hours and left the conduit suspended about 4 in. above the bottom.

This space was then filled with cement grout and allowed to harden, after which the rigging was removed. At no time was there any interruption to the service through this conduit. *From Chase News, a publication of Chase Brass and Copper Co., Waterbury 20, Conn.*



Do You Know Why 'HIGH RATIO' TRAPS *by* NICHOLSON DRAIN CONDENSATE FASTER?

IF you were asked, "Which of the two differential pistons sketched above will require the least pressure drop before the piston assembly can move up?" you would obviously answer, "The one at the left". Because of the higher ratio between the areas of its upper and lower pistons.

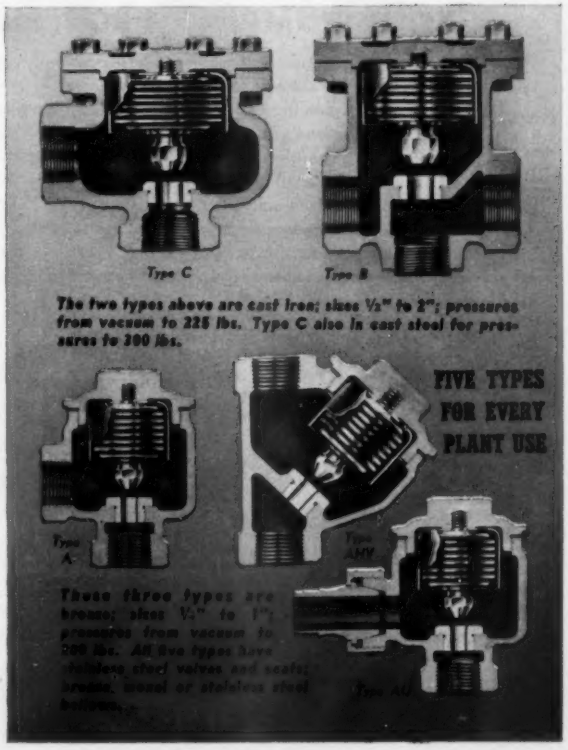
Now the line pressure in a thermostatic bellows trap is analogous to that in a differential piston. The higher the ratio of bellows area to discharge orifice area the less the pressure drop required before the bellows will contract and open the discharge valve.

Getting down to cases, the Nicholson thermostatic trap has a larger bellows than any other trap of this type, while its discharge valve orifice is approximately equal in size to any other trap. This gives a higher ratio and causes the Nicholson trap to operate on the least temperature difference between steam and condensate.

Now take the case of two traps with discharge valves of equal size and assume that they are operating at a given temperature difference.

The Nicholson "High Ratio" trap will open its valve wider and have larger capacity than the low ratio trap.

This is a reason why a Nicholson thermostatic trap operates faster and keeps a unit full of live steam. And, may we add, it's one of the advanced features that are influencing plant engineers increasingly to standardize on Nicholson.


Type C
Type B
The two types above are cast iron; sizes ½" to 2"; pressures from vacuum to 225 lbs. Type C also in cast steel for pressures to 300 lbs.
FIVE TYPES FOR EVERY PLANT USE
Type A
Type AHV
These three types are bronze; sizes ½" to 1"; pressures from vacuum to 200 lbs. All five types have stainless steel valves and seats; bronze or stainless steel bellows.

Send for NICHOLSON TRAP CATALOG 250

Catalog 250 contains capacity tables, installation diagrams, and data, charts and formulae for determining the proper size trap.

W. H. NICHOLSON & CO.

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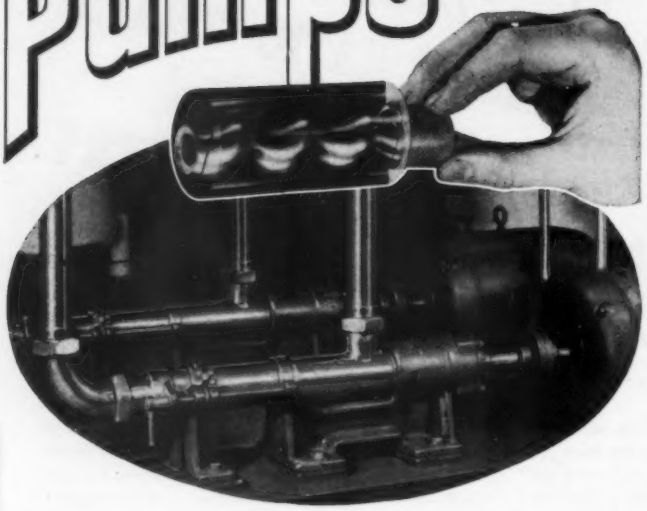
Sales and Engineering Offices in 53 Principal Cities

Pumps "Anything"



See How Simply You Can Solve YOUR PUMPING PROBLEMS

Do you want to pump tooth paste, clay slip, *diamond dust in oil* . . . hamburger, salt water, gasoline or glue? Possibly not. But the chances are that somewhere about your plant there's a pumping job you could do *better and cheaper* with amazing R & M Moynos. Pumps above deliver a high-viscosity food product to packaging machines. They're a special Moyno type for edibles—may be quickly dismantled for cleaning. Like all Moynos, they self-prime; deliver steady, *positive pressure* without turbulence . . . have no pistons or valves, and but a single moving part. Moynos are made for all services. Thousands in use. Tell us what *you* want to pump. Let us show you what *Moynos* can do.

R & M MOYNO® PROGRESSING-CAVITY PUMP

WRITE FOR THIS FREE LITERATURE. Moyno Food Pumps, Form P-3077-E; Moynos for Ceramics, Bulletin P-32-E; Moynos for other services, Bulletin P-30-E. Moynos resist abrasives and chemicals; deliver pressures to 1000 p. s. i.; stand up where *other pumps* fail. Get the facts today.

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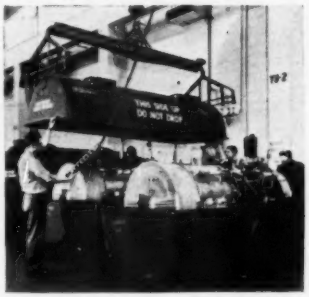
the message over a circuit leading to its destination.

One feature in thus speeding the service of the new center is a master push-button panel by which a telegram can be transmitted simultaneously to numerous offices and plants in the system. *From Wireco Life, a publication of The American Steel & Wire Co., Cleveland, Ohio.*

Jet Engines Shipped in Cans

ALL J33 AND J35 jet engines leaving Allison's assembly lines are canned before shipment. Formerly, the big engines were packed in heavy plywood boxes. Now, however, standardized, reusable, metal containers are carrying the engines to far distant points.

Packed with the engines is a dehydrating agent which insures a moisture-free shipment. Covers for the cans are sealed with rubber gaskets and bolted with air wrenches.



Cover is lowered on one engine as other jet engine is readied for canning process

Air pressure of five pounds is then forced into the containers to prevent rust. *From AllisoNews, a publication of Allison Div., General Motors Corp., Indianapolis 6, Ind.*

Countersink Holes with Ease

IT HAS BEEN said that the most powerful secret weapon of America is the inventive genius of the people in her industries. People like Jim Hill and Gordon Spivey, a pair of tool-design men at Boeing's Wichita plant.

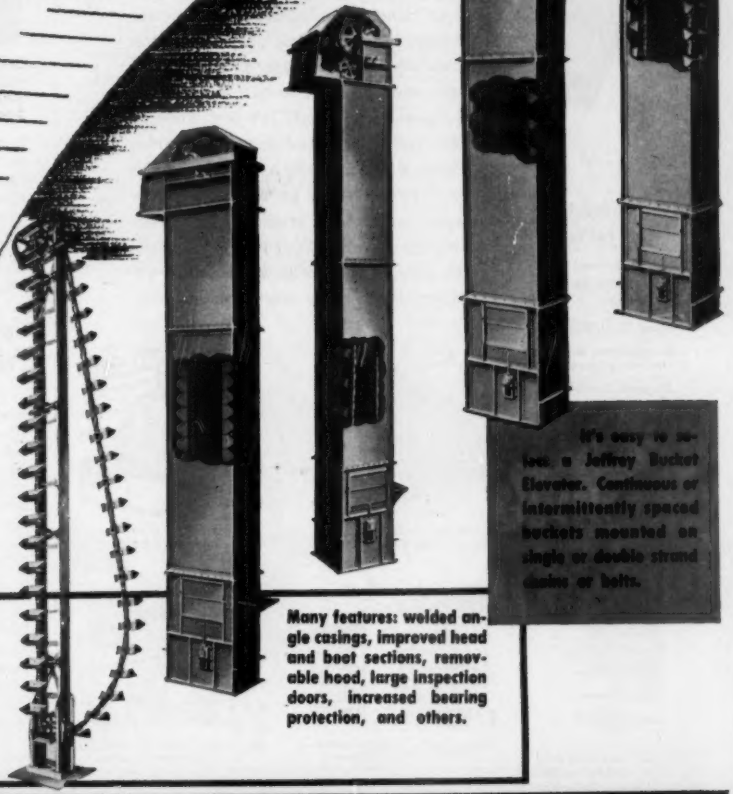
Some months ago they found themselves contemplating the enormity of the work involved in countersinking holes in the sweptback wing of the B-47 Stratojet. Each wing required 15,000 close-tolerance holes.

Par for the course, with the best tool available, was three and a half minutes per hole. And the wing's aluminum-alloy hide was so tough that workmen tired quickly, and had to be alternated frequently throughout the day.

The inventive genius of these two men resulted in a remarkable device known as an "auto-sink." With

on the "UP" and

Meaning you can DEPEND upon Jeffrey Bucket Elevator if you have material to be lifted so that something else may be done with it. Step UP your production schedules . . bring costs down. In addition, you save time and expense in making layouts and drawings . . we have worked out a complete line of standards. A type and size to meet your requirements.



Other Jeffrey Products:

Bin Valves
Belt Idlers
Car Pullers
Chains
Conveyors
Coolers
Crushers
Dryers
Feeders
Pulverizers
Screens
Transmission Machinery
Weigh Feeders

It's easy to select a Jeffrey Bucket Elevator. Continuous or intermittently spaced buckets mounted on single or double strand chains or belts.

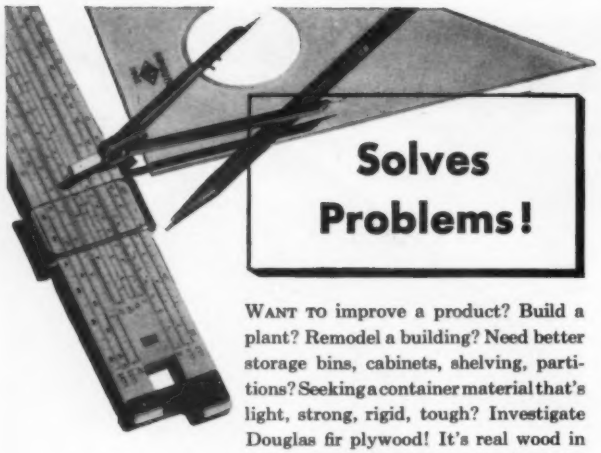
Vertical or inclined, with or without casings and with many features for the best of service and economical operation. It is a step forward to select a Jeffrey Bucket Elevator. May we hear from you?

Many features: welded angle casings, improved head and boot sections, removable hood, large inspection doors, increased bearing protection, and others.

JEFFREY

ESTABLISHED 1877

Complete Line of Material Handling, Processing and Mining Equipment



Solves Problems!

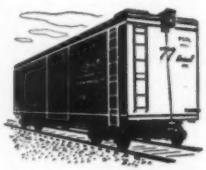
WANT TO improve a product? Build a plant? Remodel a building? Need better storage bins, cabinets, shelving, partitions? Seeking a container material that's light, strong, rigid, tough? Investigate Douglas fir plywood! It's real wood in big, cross-laminated panels; durable, versatile—as *workable* as only wood can be. Plywood solves problems for architects, contractors, engineers. For railroads, boat-yards, truck builders, designers, display men, sign shops, shippers. Plywood can solve *your* problems, too.

Put These Advantages To Work For You!

Douglas fir plywood is *real wood*, cross-bonded into panels that are:

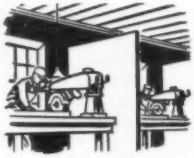
- Large, Light, Rigid
- Stronger than Steel (pound for pound)
- Rugged, Durable
- Split-Proof
- Puncture-Proof
- Crack-Proof
- Shatter-Proof
- Dimensionally Stable
- Versatile*
- Easy to Handle
- Easy to Saw
- Easy to "Jig"
- Easy to Nail
- Easy to Fasten
- Easy to Glue
- Easy to Bend
- Easy to Finish

*Two types: waterproof-bond EXTERIOR; moisture-resistant INTERIOR. Several appearance grades. Panels 4'x8' most versatile; smaller and larger sizes, too—including "extra long". Several thicknesses. Produced to rigid requirements of U. S. Commercial Standard CS45-48.



Over 100,000 Railroad Cars Have Plywood Siding and Lining

Plywood Gives Work Tables Extra Strength, Rigidity



Plywood Builds Sturdy, Attractive Office and Plant Partitions

Big Plywood Panels Are Preferred for Prefabricated Buildings

Douglas Fir
Plywood

AMERICA'S BUSIEST BUILDING AND INDUSTRIAL MATERIAL

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Man in background operates new autosink tool with little effort. Man with standard countersink must exert steady pressure, takes more time to do job

it a half-inch hole can be countersunk in 30 to 40 seconds, and it is handled with minimum effort by a single operator who winds up no more than normally tired after a full working day without relief. *From Boeing Magazine, a publication of Boeing Airplane Co., Seattle, Wash.*

Use Organic Materials For Sludge in Boilers

MOST OF THE troubles with hard scale in boilers have disappeared over the past quarter of a century due to better external water softening and to internal treatment with phosphate chemical. In some boilers, however, a new problem has come up. Instead of a hard scale, a much softer material, called sludge, may be found in the boiler tubes.

This usually doesn't cause any trouble, but sometimes this sludge may become so heavy that it will completely block off a tube and no water will circulate through it. This tube may then become so hot that it will burst, spewing steam throughout the boiler and forcing the operators to shut down the unit.

There are a number of ways in which this sludge trouble may be corrected. The softening of the water may be further improved, mechanical changes may be made in the boiler to improve water circulation and give better mixing of the incoming feedwater with the boiler water, or other chemicals may be added to the boiler water.

Among these other chemicals are organic materials. These organic materials do their work by keeping the sludge suspended in the water, thus preventing it from forming harmful deposits. In a large number of cases this method of treatment has worked very well. In some cases, however, more harm than good has resulted, either due to the fact that the organic material would

READY NOW! Complete, Up-To-Date Bulletin to assist in making plants, areaways, loading docks, etc. SAFE FROM ILLEGAL ENTRY!

Today, every foresighted plant executive is going into action on the subject of better plant protection against all intruders and trespassers. As pointed out by civic defense leaders in current newspaper articles, all plants, and especially those engaged in work vital to defense, should take immediate steps to prevent espionage and sabotage.

One of the principal measures recommended is LIGHTING FOR PLANT PROTECTION. Experience has proved that one of industry's first defense lines against illegal entry is LIGHT. When industry wraps its property in the shining armor of protective lighting, it erects a barrier through which few intruders dare to pass. Moreover, protective lighting is of tremendous aid to guards and police as it creates a "no man's land" which can be easily patrolled and in which any suspicious person is instantly detected.

Benjamin Distributors are ready to assist you in the planning of protective lighting systems. By consulting them you draw on Benjamin's 50 years' experience in the manufacture of lighting equipment.

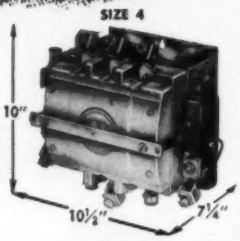
The NEW BENJAMIN BULLETIN ON LIGHTING FOR PLANT PROTECTION brings you concise information to help you plan protective lighting for your plant areas. It contains complete data on Benjamin Lighting Units suitable for protective lighting and tells how and where to install them to fit the specific protective lighting problems, found in the lighting of fences, areaways, buildings, as well as such vulnerable spots as spaces along railroad tracks, narrow alleys between buildings, yard entrances, and streets that dead end at the property line.

This information Bulletin is yours without cost or obligation. It may be obtained from your Benjamin Distributor or by writing to: Benjamin Electric Mfg. Co., Dept. PE, Des Plaines, Illinois.

MEET THIS IMPORTANT FAMILY

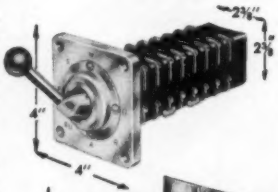
ARROW-HART STARTERS

Arrow-Hart makes a complete line of motor starters and contactors — manual, magnetic, 2-speed and reversing. A-H Type "RA" starters feature an exclusive mechanism which reduces size by ⅓, while adding to dependability and performance. Available in sizes 0, 1, 2, 3, 4.



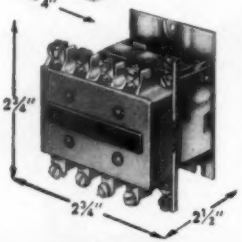
ARROW-HART "PPS" SWITCH

The A-H "PPS" provides a single point of control for multiple-operation machines—eliminates wasted time and effort of the operator, saves space, simplifies and reduces cost of control. Up to 16 dial positions available. Custom built to your requirements from standard components.



ARROW-HART SIZE 00 TYPE "CRA" CONTACTOR

Inches smaller, every inch a champion. More compact, more versatile, more adaptable than any contactor on the market. Can be instantly altered to suit specific circuit requirements. Self-same contacts may be reversed to alter circuits. Simple wiring, mounting, connecting. 4 or 8 pole arrangements without additional panel space.



WRITE FOR LITERATURE

Meet this important A-H family of industrial controls, that is playing a vital role in industry's efforts toward INCREASED PRODUCTION AT LOWER COST. Send today for engineering data and product literature on the A-H controls in which you are interested.

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ARROW·HART

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cause the boiler water to foam or that it would break down in hot spots in the boiler and thus form a scale itself.

It is important to know just when and when not to use these organic materials. Considerable experience, knowledge of the particular boiler, correlating information from other users, and a lot of horse sense will supply the answers when to use organic materials. *From a paper by R. W. Liddell and L. C. Bishop, Hall Laboratories, Inc., presented at the Midwest Power Conference.*

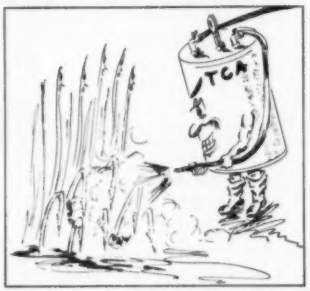
TCA Takes Care of Grassy Weeds

NEARLY EVERY one has heard of 2, 4-D, which takes care of many broadleaved plants. But what to do about the grassy weeds?

Federal, state and commercial weed control researchers have carried on extensive tests to find something that would kill superfluous grass and not sterilize the soil for a long period. They have tested hundreds of chemical formulas, but one of the most promising is TCA, abbreviation for trichloroacetic acid.

Although the new herbicide is quite selective, affecting grasses more than most broadleaved plants, it is not as selective as 2, 4-D, which has little effect on plants in the grass family, including cereals.

In the fall of 1949, the weed areas on the Yuma project used about 3,000 lb. of TCA at a rate of 120 lb of 90 per cent material applied as a



coarse spray on Johnson grass and carrizo cane. The Johnson grass was reduced by 90 to 95 per cent in sections of ditch where the banks were not disturbed throughout the season. Only about 40 to 50 per cent eradication resulted where the canal was dredged or where the grass was burned during January or February. TCA retarded the growth of carrizo cane until late summer but did not reduce the number of plants.

The combination of TCA to 2, 4-D, has proven effective in the control of cattails. This method has since been tested in several regions with varying results. However, in most cases it was found that TCA plus 2, 4-D, gave better results than 2, 4-D, alone. More testing is needed on this method before general recommendations can be given.

Here is *Exactly WHY* a V-Belt with CONCAVE SIDES Gives You *Longer Wear!*

To see for yourself how a V-Belt that has *concave sides* is certain to give longer wear, just make this simple test:—

Pick up any V-Belt you have at hand. Bend that belt as it bends around a pulley. As it bends, grip its sides between your fingers. Here is what will happen *everytime*.

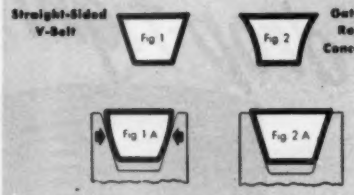
If the V-Belt you are testing has *straight sides*, you can feel those sides *bulge out* as the belt bends. This out-bulge forces the sides of the belt to press *unevenly* against the V-Pulley and you naturally get *concentrated* wear just where the bulge is greatest—as shown in figure 1-A, at right.

Now, make this same test with the belt that is built with Concave *Sides*—the Gates Vulco Rope!

Whereas you felt an *out-bulge* when you bent a belt with straight sides, you find that the *Concave Sides* merely fill out and become *perfectly straight*. The sides therefore *press evenly* against the V-Pulley. This distributes the wear *uniformly* across the *full width* of the belt. Naturally, this means longer belt life and *lower* belt *costs* for you!

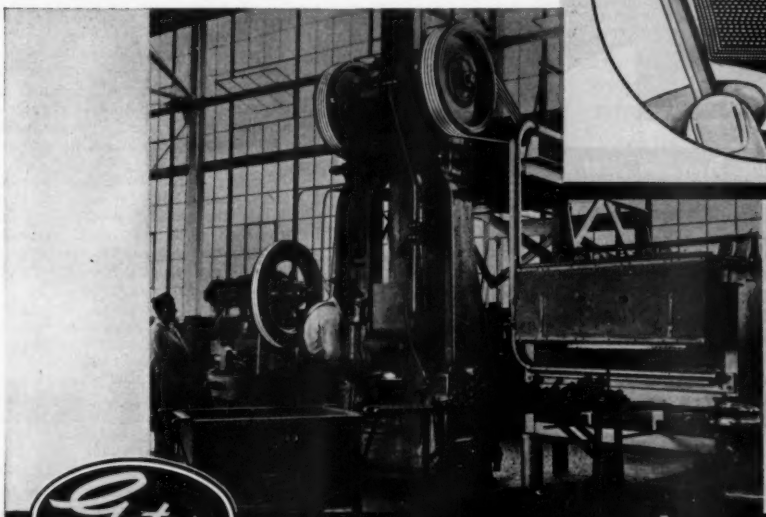
Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley — Uniform Wear — Longer Life!



This drop hammer in the plant of Kortick Manufacturing Company of San Francisco is operated by the Gates Vulco Rope Drives shown. Mr. W. H. Reiman, Plant Supt., says: "...a great improvement in the speed of the return stroke...gives us a positive drive without slip, yet one that absorbs the shock of picking up the ram repeatedly."

A CS-517

Gates®
Hose V-Belts
Molded Rubber Goods
for Industry

VULCO ROPE DRIVES
ENGINEERING OFFICES AND JOBBER STOCKS
IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

You can't beat a DART for a snug drop-tight fit!

Why? The answer is easy! It's because Darts are made with greater care.

Take the joint, for instance! Both seats are made of resistant bronze; both are swaged into place under great pressure — permanently interlocked with the ends. And both are precision machined, then carefully spherically ground to give very wide, near perfect contact.

Finally — to protect the seats, give extra strength — ends and nut are made of *practically indestructible,* air-refined, high test malleable iron.

Little wonder Darts are drop-tight without excessive wrenching. No wonder you can use them again and again.

DART UNION COMPANY
Providence 5, Rhode Island
The Fairbanks Co. — Distributors
Boston New York Pittsburgh

DART
UNIONS

Soil-moisture conditions play an important part in the effectiveness of TCA, because the best results are obtained when it soaks down to the roots. The best kills resulted when a half-inch of rain fell about 2 weeks after the applications, and carried the herbicide into the soil. On the other hand, heavy rains have a tendency to leach the chemical out of the soil before it can do its work.

In using TCA certain precautions should be taken. The ammonium salt, which was used in some of the earlier tests, is corrosive but the sodium salt is nearly neutral. The solution should not come in contact with the skin, and equipment should be thoroughly flushed out after each use. Soil should not be treated in the root-feeding zone of trees, grapes, ornamental shrubs or other plants which you want to save. Further testing of this chemical formulation is needed before general recommendations can be given. *From The Reclamation Era, a publication of The Bureau of Reclamation, U. S. Dept. of Interior, Washington 25, D. C.*

Protect Your Plant Against Lightning Damage

YOU SHOULD NOT consider your plant secure from lightning damage if you permit susceptible equipment and structures to be without adequate lightning protective equipment. Attention to certain vulnerable portions of the plant will provide you with a greater margin of safety against a direct attack from nature's power houses.

Stacks—Be sure that all stacks, whether metal, masonry or concrete, are properly protected. Grounding of a metal stack alone should suffice; all other stacks should be equipped with an approved lightning rod installation.

Storage tanks — Outside storage tanks, especially those containing liquids that will burn, should be grounded in an approved manner; at least two connections to driven grounds are usually necessary with more needed on larger tanks.

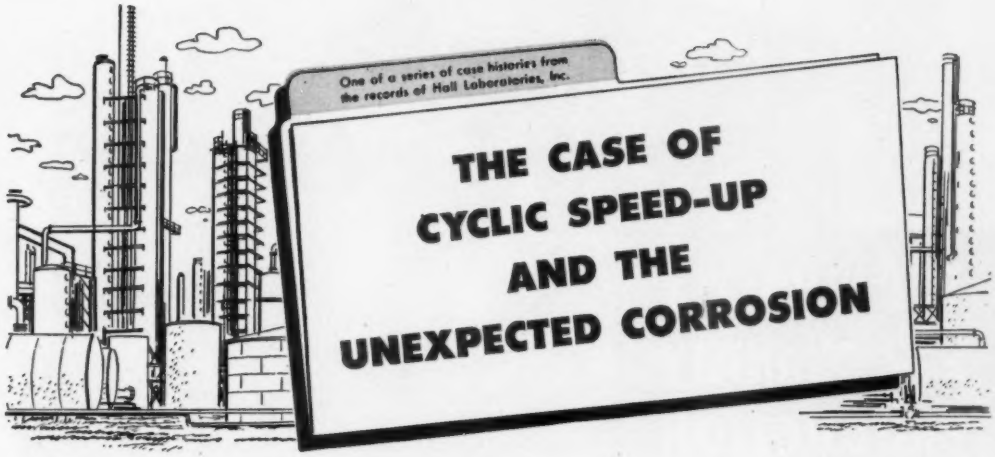
Process equipment—Outside process equipment, such as towers, stills and conveyors should each have its own protective ground.

Transformers — Outside transformers, sub-stations and other similar installations should all be protected in accordance with the National Electrical Code.

Structures—Those structures projecting above buildings such as signs, flag poles, aerials, metal gutters and cornices should also be protected in an approved manner against lightning damage.

Proper maintenance of the foregoing protection equipment is as important as proper installation.

(Continued on page 38)



One of a series of case histories from the records of Hall Laboratories, Inc.

THE CASE OF CYCLIC SPEED-UP AND THE UNEXPECTED CORROSION

This industrial process involved thermal refining of a vegetable oil. The batch-processing plant functioned by shooting steam through a heat exchanger, following this with water for cooling. So to process more oil without building a new plant, the hot-to-cool cycle had to be repeated more times per day.

The plant Engineering Department worked out a method of speeding up the cycle by using extended-surface tubes in the exchangers. For a time, the new system worked well but soon production slumped because of repeated failures due to corrosion.

The men in the Engineering Department had relied for years upon the Hall System of Boiler Water Conditioning in connection with the power plants of the company. They knew, furthermore, that Hall Laboratories had broad experience with all kinds of industrial water problems. So they brought their new problem to Hall for a cooperative appraisal.

On the basis of the facts presented, Hall engineers at headquarters suggested both mechanical changes—improvement of deaeration and redesign of headers to get better flow—and chemical treatment—a few parts per million of amine in the steam, a few parts per million of Calgon in the water. In the field, Hall engineers followed through by checking actual conditions at intervals. As a result of this complete engineering approach, corrosion was greatly reduced and the processing units now stay in production.

Let Hall Laboratories tackle your specific water problems. Clip the coupon for more information.

HALL LABORATORIES, INC.

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CONSULTANTS ON BOILER WATER CONDITIONING;
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Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.
Please send me your bulletin: Let's Consider Your *Whole* Water Problem.

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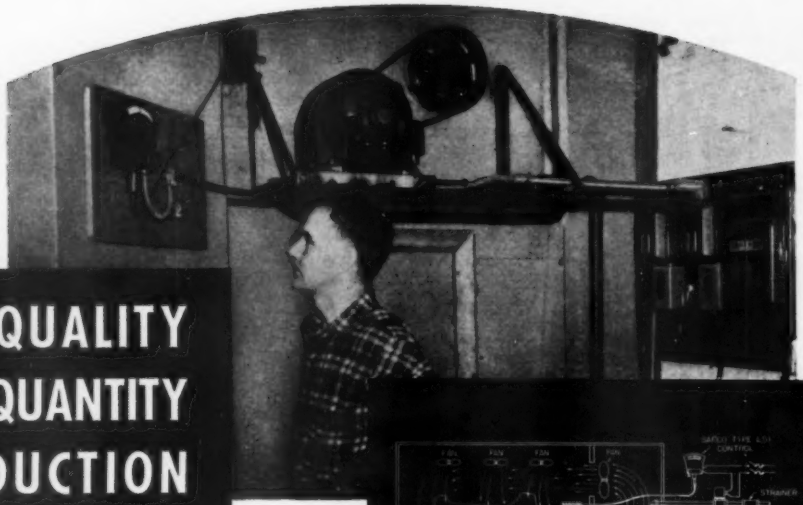
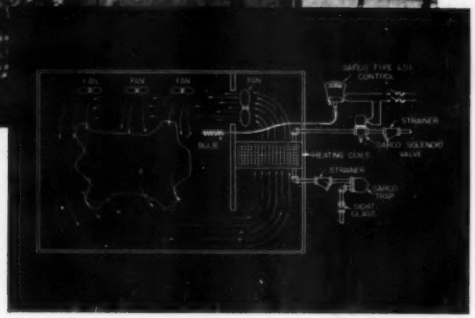


TOP QUALITY *and* QUANTITY PRODUCTION

for this Sarco Controlled Drying Operation



SARCO PRODUCTS FOR FOODS AND CHEMICALS

Float-Thermostatic Steam Trap

Thermostatic Steam Trap

Sarco Tank Temperature Control

LSI Electric Control

Pipe Line Strainer

Thousands of dollars worth of hides pass through drying chambers every day, in this New England Tannery plant. Who can watch the thermometers and run around turning valves fast enough to prevent the hides from "burning"? Who knows whether the equipment has been run at top capacity with a minimum of precious fuel used?

No human being can claim perfection on a job like this — but Sarco can, and proves it every day on a score of different kinds of drying operations in a dozen industries.

In the plant illustrated, the inexpensive Sarco LSI increased production with the same equipment and operators — and without losing hides due to incorrect drying temperatures.

IN YOUR PLANT it may be a temperature control on hot water or a few dollars spent for individual traps on every steam coil that will boost production with less fuel, and insure a better, more uniform output. A few of the Sarco Products that do just that are shown at the left. Send us a sketch of your heating processes or ask to have the Sarco man near you look over your plant.

309

SARCO SAVES STEAM

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Represented in Principal Cities

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IMPROVES PRODUCT QUALITY AND OUTPUT

BULLETINS just released and of immediate plant interest

MAINTENANCE

101 Gravel Roof Care—"Planned Maintenance for Tar and Gravel Roofs," is an illustrated bulletin of special interest to plant engineers concerned with maintenance of roofs of this type where it is advisable to remove all the gravel. Describes economical, labor-saving techniques for removal of gravel by machine, and the mechanical pumping of roofing materials from the ground to the roof. The Tremco Mfg. Co.

102 Corrosion Control Coatings—What is described as a most complete and authentic presentation on characteristics, properties, uses and methods of application of synthetic rubber resin based coating is contained in this 12-pp brochure. Covers machinery enamels, damp-wall enamels, stucco-masonry coatings and scuff-free floor finishes, primarily formulated for resistance to corrosion or erosion. Casey & Case Coating Co.

103 Tape to Stop Corrosion—How to stop service pipe corrosion with tape is explained in this 4-pp illustrated brochure. Tells how company's electrical tape combats corrosive action of moisture, alkalies, oils, fats and fungi on underground gas service pipes. Features report of a gas company citing tape's exceptional corrosion protection, speed of application, other advantages. Includes photos showing application techniques, and listing of tape's chemical, physical and electrical properties. Minnesota Mining and Mfg. Co.

104 Floor Maintenance—This is an authoritative 12-pp brochure illustrated by photos, diagrams and drawings and presenting a complete, effective and economical program for the care of wood and concrete floors, terrazzo, linoleum and tile. Points discussed in detail include wear resistance, appearance, sanitation, cleanliness, light reflectance, sealers and hardeners, burnishing and buffing, waxing and painting of concrete floors. The Tremco Mfg. Co.

105 Mobile Ladders—This 6-pp illustrated bulletin stresses safety advantages of all-steel mobile ladders of one to eight steps, also a new four-step ladder with adjustable push bar hangers for use with stock carts. Ballymore Co.

106 Chemical Cleaning Service—Reduced maintenance costs and outage time are among advantages of company's chemical cleaning service for steam equipment and water lines discussed in this 8-pp bulletin. Before-and-after photos show some actual cleaning jobs and several case histories are given. Company's service procedure and facilities outlined. Dowell Inc.

MATERIALS HANDLING

107 How to Use Conveying Systems—Eight-pp Bulletin W-1048 shows how to effect operating and labor economies through use of conveying systems in production operations. Basic types of conveyors and where and how each can be used most efficiently are described and illustrated. Booklet explains types of conveyors best suited to handling various products under typical conditions. Chief components of individual systems are discussed, also savings effected by on-site assembly of pre-fabricated units, using plant labor. Walter Maguire Co., Inc.

108 Steel Belt Conveyors—This 20-pp booklet presents a conveyor system in which belt and chain become a single unit, the belt itself acting as the chain and being directly moved by the drive sprocket—a simplified design for lower construction costs and reduced maintenance. Explains and illustrates how conveyor is built, and pre-engineered to plant needs; pictures some of its varied applications. Presents portable as well as stationary models, also elevating and vertical conveyors. Includes specifications, engineering data. Steel-Parts Mfg. Co., Div., Blackstone Mfg. Co., Inc.

109 Trolley Hoists—Bulletin DH-280, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

110 Vertical Transportation—This 34-pp illustrated booklet describes modern passenger elevator systems, escalators, freight elevators, industrial truck elevators and easily-operated dumbwaiter equipment. Sections on passenger elevators cover recommended sizes and capacities for light and heavy traffic, automatic controls, cars and entrances. Selection and engineering data provided on all equipment presented. Otis Elevator Co.

111 Electric Lifters—Medium and heavy-duty electric lifters are described and illustrated in Bulletin LU50. Company's ball bearing hoisting unit incorporated in these lifters is discussed and mechanical data included. Economy Engineering Co.

112 Lift Truck Data Sheets—New, comprehensive information on four of company's lift truck models is announced in these data sheets. They cover pallet and platform type models, a power tongue truck for semi-live skids and a tractor and pusher type. The data sheets, suitable for filing, give dimensions, capacities and operating performance figures, also turning radius charts. Lift Trucks, Inc.

113 Hand Lift Trucks—Bulletin 3141, 24 pp, presents company's improved line of hand lift trucks, describing in detail trucks in capacities of 1000 to 15,000 lb, and providing design drawings and specifications. Three new hydraulic models developed for easier one-man handling of heavy loads are shown. Close-up views illustrate advanced mechanical features of single stroke hand lift trucks. A chapter on selection of proper truck for the job is included. Barrett-Cravens Co.

114 Drawbar Pull Tractor—Manufacturer's newest Shop Mule, a 12,000 lb drawbar pull tractor with torque converter is presented in illustrated Bulletin 1545. Gives operating data, dimensions and specifications on this tractor designed for toughest of push-pull jobs. The Buda Co.

115 Fast Bulk Handler—Form 167, 12 pp, describes company's Model HA Payloader and pictures some of the many jobs this 12 cu ft capacity handling unit is designed to handle. Construction and operating features are illustrated, ease of servicing discussed. Specifications included. The Frank G. Hough Co.

116 For Palletized Handling—Reversible, non-reversible, semi-open and full-open pallets are illustrated and described as to application in this folder. Also describes box and rack pallets. Williford Mfg. Co.

SAFETY, FIRE PREVENTION

117 Eye Protection Manual—Catalog S-1322 is a 60-pp comprehensive presentation of eye protective equipment and covers all types of safety glasses, face shields, helmets and accessories. All equipment is illustrated and specific applications discussed. There is also a helpful eye-safety guide covering the various eye hazards involved in 18 industries and recommending eye protection needed. Booklet also explains company's over-all plan for industrial safety and visual correction in addition to eye protection. Protective frames and safety lenses, their properties and manufacture, are described in detail. Instructions on measuring for safety eyewear included. American Optical Co.

118 Protection for Welders—Up-to-date eye and face protective equipment and respirators for both arc and gas welding are described in this illustrated bulletin. Covers spectacles, goggles, glass holders and helmets, also a special helmet lens for use by welders who wear bifocals, and detachable rubber padding for goggles. Describes various safety lenses available, and includes selection chart giving recommended uses. Willson Products, Inc.

119 Safety Glasses with Comfort Features—Described and pictured in Bulletin A-953 are acetate plastic frame safety glasses with adjustable nose pads, and high-placed spatula temples. Stresses ease of wearing, non sparking and frontal impact resistance of these glasses; tells where they may be worn and who should wear them. Also presents special acetate frame glasses with side shields and chip-resistant or tinted lenses. Tells how to order. Bausch & Lomb Optical Co.

120 Safe Truck Operation—"Safety Saves!" is a cleverly written 24-pp booklet setting forth "do's" and "don't's" established as a practical code of truck operation. The admonitions, presented in easy-to-take good-humored fashion, and pointed up by cartoons, are offered as a "refresher course" for experienced operators, and as a fundamental text for those new at the job. Industrial Truck Div., Clark Equipment Co.

121 For Safer Floors—This small folder describes briefly a line of floor maintenance products intended to provide greater safety underfoot. Includes floor cleaners, polishes, sealers, protective coatings; also a floor cleaning machine, damp sweeping tool and grounding device. Walter G. Legge Co., Inc.

July, 1961

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PLANT ENGINEERING

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Also, use this card for more information on advertised products.

122 Where CO Is a Problem—A simple, easily used carbon monoxide indicator is described in 2-pp Bulletin C1-101A, illustrated in color. Explains how this pocket-size instrument utilizes indicating gel and color chart to show presence and concentration of carbon monoxide in furnace rooms, mills, chemical plants, refineries, etc. United States Safety Service Co.

123 Fire Extinguishing Equipment—Besides describing fire extinguishers and extinguishing systems, this 16-pp illustrated booklet includes a helpful discussion on classes of fires and proper type of extinguishers for each class. Describes in detail several CO_2 type extinguishers and a CO_2 system offering automatic, manual and remote control protection for a wide range of equipment and areas. Also presents foam, dry powder, soda acid and other types of extinguishers. Randolph Laboratories, Inc.

124 Fireproofing Cement—How manufacturer's fireproofing cement can reduce fire losses is told in 4-pp illustrated Form A200. Tells how and where to apply it, gives fire test data, coverage, recommended thicknesses. The Eagle-Picher Sales Co.

INSTRUMENTS AND CONTROLS

125 Remote Controls—Twelve-pp Bulletin 645 presents pneumatic remote controls for safe, accurate operation of machines and other equipment. Fully illustrated with photos of models and machine installations, gives application and ordering data on four types of master valves and a wide variety of pilot valves. Some typical applications are discussed. The Tomkins-Johnson Co.

126 Combustion Guide — Publication S1-553 describes combustion meter (CO_2 recorder) telling its application as an index to fuel burning efficiency, explaining its operating principle and discussing its features. How meter works, and is installed, and how sampling is achieved are described and illustrated. Specifications included for both recording and recording-indicating models. The Hays Corp.

127 Speed Recorders and How to Use Them—Catalog N-27 is a 20-pp recent revision of company's manual and ordering book on speed recorders and tachometers. Discusses and compares principles of operation of company's Micromax and Speedomax instruments, pointing out special advantages. Photos show wide range of application for these recorders. A completely new line of tachometers is also presented. Leeds & Northrup Co.

128 Potentiometer Controller — Illustrated Specifications Sheet No. 175, 2 pp, gives engineering data on company's new Electronik strip chart pneumatic control potentiometer. This instrument combines advantages of pneumatic control with the strip chart instrument. Industrial Div., Minneapolis-Honeywell Regulator Co.

129 The Story of Instrumentation—This small, 12-pp booklet tells a brief, non-technical story of instrumentation in every-day life. Covers company's products in more than a dozen fields. Weston Electrical Instrument Corp.

PUMPS

130 Self-Priming Pumps—A new line of self-priming centrifugal pumps in capacities from 4000 to 90,000 gph are introduced in Bulletin 51-27, 20 pp. Describes and illustrates their simplicity of design, accessibility and portability, leakproof seals and other features. Includes specifications. Chain Belt Co. of Milwaukee.

131 Boiler Feed Pump—A barrel-type boiler feed pump designed for high pressure, high temperature service and offering ability to go on the line quickly without preliminary warm-up, is the subject of 12-pp Bulletin 1525. Fully illustrated text explains automatic operation of hydraulic thrust balance incorporated in this pump. Impellers, diaphragms, bearings and stuffing boxes are described, ease of servicing discussed. DeLaval Steam Turbine Co.

132 Multi-Pump Tank Controls—Illustrated Bulletin 1110, 4 pp, describes company's pressure operated pump controls for elevated tanks with two or more pumps. Explains operating principle of twin-bellows design utilized in control for each pump, discusses other features. Gives typical specifications, installation tips. Automatic Control Co.

PACKINGS AND GASKETS

133 Packing Rings—Manufacturer's Vee-Flex packing rings are featured in this bulletin. These rings are for use in valves, pumps, hydraulic cylinders, and bulletin discusses conclusions of company engineers from tests performed at outside laboratories. Dimensions, service recommendations included. Packing Div., Raybestos-Manhattan, Inc.

134 Industrial Gaskets—This recently-published 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon packing and expansion joints and teflon stock. Includes both engineering and ordering data, application and installation suggestions. Generously illustrated with photos and drawings, also provides temperature conversion and steam tables, other helpful tabular matter. United States Gasket Co.

135 Packings and Gaskets — Catalog P-1000, 32 pp, illustrates and describes the 26 most popular packings and gaskets in company's line, furnishing complete details of construction, service recommendations and size information on each item. Featured in this excellent booklet are charts showing specific recommendations for a wide variety of applications. Packing Div., Raybestos-Manhattan, Inc.

ELECTRICAL

136 Co-ordinated Protection of Motors—The interlinked protection of circuits, motors and personnel is explained in 12-pp Bulletin DB-4673 on high-voltage combination starters. Because almost every 2300/4800 v power system can produce high currents under short-circuit conditions, booklet stresses this interlinked protection, covering three classes of combination motor starters: and air-break type for squirrel-cage induction motors; a starter with oil-immersed contactor, and a combination synchronous motor starter with company's Slipsyn field control. The fuse used in each starter is described and illustrated to show its fault-protecting abilities. Comparative discussions of contactor types are provided to facilitate selection. Westinghouse Electric Corp.

137 Fan-Cooled Motors—Bulletin 63B-7150A, 6 pp, describes types of construction and ratings of company's improved totally-enclosed, fan-cooled motors with tube-type, air-to-air heat exchangers. Includes chart showing ratings of these motors in squirrel-cage, wound-rotor and synchronous types for both horizontal and vertical installation. Explains that these motors can be modified to be made explosion proof, or supplied with construction of metals resistant to atmospheric acids or alkalies. Allis-Chalmers Mfg. Co.

138 Motor Selection—Bulletin GEI-1 presents briefly manufacturer's line of motors, describing and illustrating single-phase, polyphase, and squirrel cage models. Gives ratings, applications. Wagner Electric Corp.

139 Large Induction Motors—Where the large polyphase induction motor fits into the industrial picture is told in 28-pp Booklet B-4730. Presents a quick summary of the two basic kinds of induction motors—squirrel cage motors for constant-speed drive, and wound-rotor motors for adjustable-speed drive. Unit-type stator and all-metal rotor are discussed and bearing accessibility illustrated, as are other construction features. Applications are illustrated for a number of industries. Westinghouse Electric Corp.

140 Industrial Truck Batteries—Construction features of company's batteries for electric hand trucks are explained and illustrated in this bulletin, and the reasons for their efficiency, low costs and other advantages are cited. The Electric Storage Battery Co.

141 More Power from Your Batteries—Eight-pp Form GB-1369 presents company's plan for conserving and extending battery power, under which battery performance can be substantially increased. The plan is a complete and integrated system of manuals, articles, specifications, bulletins, charts and record cards which explain how to select, charge and handle, maintain and determine condition of batteries without waste. Industrial Div., Gould-National Batteries, Inc.

142 Data on Transformers — Bulletin S-501-B offers 32 pp of ordering and engineering information on current, potential and metering transformers. It's packed with technical data in the form of detailed drawings, accuracy limits, ratio and phase angle curves. Well illustrated, indexed, punched for filing in ring binder. The Standard Transformer Co.

143 Know Your Calibration Symbols?—Here's a handy 8½ by 5½ in. chart show-

(Continued on page 93)

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today piping repairs cost more!

You make fewer of them

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CRANE VALVES

...That's why more Crane Valves are used than any other make

No bonnet joint trouble with this valve

A typical example of low-maintenance Crane Quality—No. 465½ 125-Pound Iron Body Gates. Rarely does the bonnet joint need attention. Flange construction includes reinforcement to prevent distortion and utilizes more bolts, more closely spaced, than is usual in valves of this class. Crane precision-guided seating reduces seat and disc wear. Packing has long life because these valves have a deep stuffing box filled with high grade asbestos ring packing. A ball-type gland helps to equalize the packing load.

Better performance features like these make Crane the better buy in valves of every type. Ask your Crane Representative for a demonstration of Crane better valves.

CRANE CO.

General Offices:
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VALVES • FITTINGS • PIPE • PLUMBING • HEATING

no worry and fear... no costly down time here

Management and workers alike know their plant is safeguarded from fire. No chance of a short circuit, a stray spark, a forgotten cigarette or spontaneous combustion starting a raging fire that could cut into vital production time, endanger the lives of employees or damage hard-to-get equipment, thanks to efficient, quick-acting C-O-TWO Fire Protection Equipment.

You too, can have this same secure feeling . . . this same positive protection from costly fires by installing complete, approved C-O-TWO Fire Protection Equipment. For example, the new C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems keynote flexibility to meet your particular fire protection needs. Flammable liquids, electrical equipment, storage and manufacturing processes can all be made firesafe from a single low pressure carbon dioxide storage tank . . . capacities range from one to fifty tons of fire-killing carbon dioxide. If fire should strike . . . fast, clean, non-damaging, non-conducting carbon dioxide extinguishes the blaze in seconds . . . no water damage, no after fire mess.

Further, when a C-O-TWO Smoke or Heat Fire Detecting System is used in combination with a C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing System, the first trace of smoke or spark of fire in a protected area immediately sounds an alarm . . . then the fire quenching carbon dioxide is readily released into the threatened area.

So, whatever your fire protection problem, let an expert C-O-TWO Fire Protection Engineer help you in planning complete and up-to-date fire protection facilities now. Write us today . . . tell us about your particular fire hazards. Our experience is at your disposal . . . no obligation of course.

C-O-TWO

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MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems Built-In Smoke and Heat Fire Detecting Systems

(Continued from page 32)

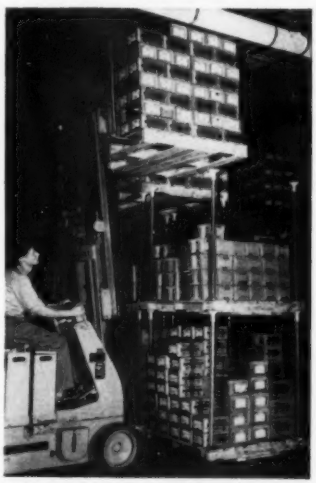
Visual inspection alone is not sufficient to determine the actual protective value of an installation. Instrument tests, which can be made by your public utility company, will determine the electrical efficiency of protective grounds and these tests should be made periodically. *From Sentinel, a publication of Factory Insurance Association, Hartford 2, Conn.*

Storage Space Doubled By Eliminating Manual Operations

THE VOLUME of warehouse goods at Westinghouse Electric Corporation's lamp warehouse, Trenton, N. J., was doubled, yet less than 6 per cent of storage space was added.

The warehouse building, which is connected to the lamp manufacturing plant by a 562 ft long overhead enclosed bridge, contains 275,000 sq ft of space. This compares to 260,000 sq ft formerly used to warehouse half as much merchandise.

However, the improvement is more than a matter of increasing space. In the new quarters, Westinghouse uses the latest electric handling equipment—fork trucks and conveyors. In the old quarters, it employed manual methods throughout, equipping employees with hand



Tiering up to the rafters means full use of space at this lamp warehouse

trucks and four-wheel warehouse trucks. Tiering by hand was slow and laborious and goods could not be stacked very high. Fork lift trucks are now stacking goods 144 in. high, and in some areas, 158 in.

The handling process is simple, and retains only one manual step between packaging and shipment, that of palletizing the cartons of merchandise right after they are tested and packed. Cartons of incandescent bulbs go from the packing area in

TESTING TIPS

Load Studies Made Easier With CF Inkless Recorder

In order to plan distribution of power in your factory it is necessary to make accurate long-period circuit voltage surveys. This can only be done efficiently through the use of recorders. The G-E Type CF-1 inkless recorder is ideal for this operation. It is designed for dependability and maximum convenience. With the CF-1, one skilled electrician or engineer can supervise the power requirements for an entire plant. Records of various machines in operation can be gathered into one place for one man to analyze.

Today it is vital that survey records show load pictures on various critical machines throughout the plant. The CF-1 will tell you whether increased schedules are overloading machines and shortening the life of your equipment. You save by avoiding costly down time and overhauls.

Available in a variety of voltage ranges the CF inkless recorder has an accuracy of 1½ percent of full scale-value—its record roll can run as long as 30 days without attention.

FEEDER CAPACITY SURVEYS DIFFICULT

New AK-3 Hook-on Instrument Reads Power Factor Directly

To get a true picture of power-factor conditions in your plant, p-f measurements must be made frequently and at different points in the circuits. Your present method of measuring p-f requires: power shut-off, cutting of lines, and connection of instruments into both current and potential circuits. These time consuming tasks make the new G-E Type AK-3 hook-on power factor meter an essential instrument for your maintenance kit. Power-factor readings are obtained by merely hooking around the line, clipping in the voltage leads, and reading p-f directly on the dial.

Power factor is more important than ever today when we are trying to obtain the maximum capacity from factory circuits. Capacitors are one of the quickest and least-expensive ways of increasing feeder capacity. They can permanently release up to 30% more electrical capacity in your power system. This means extra capacity available for new lighting and motor loads—with no additional transformers or distribution equipment needed. The table at right will show you what you can expect from capacitor additions to your feeder lines.

The AK-3 may be used on any balanced 3-phase circuit. It reads power factor directly in circuits with voltages from 100–600 volts, and currents from 15 to 600 amperes. It is accurate to within 0.05 p.f.

If your power factor is now	you can release this much extra capacity	with this many capacitors for each 100 kw of load
65%	34%	84 kvar
70%	29%	69 kvar
75%	23%	55 kvar
80%	17%	42 kvar
85%	11%	29 kvar
90%	5%	15 kvar

(Power factor is raised to 95%. New load is at original power factor.)

PLANT SUPERINTENDENT REPORTS . . . "With my new AK-2 hook-on wattmeter I can do this job in a quarter of the time it formerly took me with conventional instruments."

Mr. W. D. Bostwick, pictured at left, is the plant superintendent for Bramley Storage Co., Cleveland, Ohio. Bramley has a power block in Cleveland which contains 15 companies, all manufacturing widely different products. With more of these companies turning to defense production, load conditions are increasing. "We have an extensive distribution system in our plant and this AK-2 has made it possible for us to make a complete load and power factor survey quickly and accurately," says Mr. Bostwick.

With the AK-2 hook-on wattmeter, this testing job has been made easier. There is no interruption of service, you just clip the two potential leads across the line, hook the AK-2 around one conductor and take your reading in watts. The AK-2 measures single-phase and polyphase circuits with an accuracy of 5% of full-scale value. Extremely light—it weighs only 4 pounds.

GENERAL ELECTRIC

602-201

SECTION B 602-201, GENERAL ELECTRIC
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Please send me the following bulletins:

Indicate:
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X for planning in immediate project

☐ Type AK-3 Hook-on Power-factor Meter GEC-775
☐ Type AK-2 Hook-on Wattmeter GEC-591
☐ Type CF Inkless Recorder GEC-215

NAME .....
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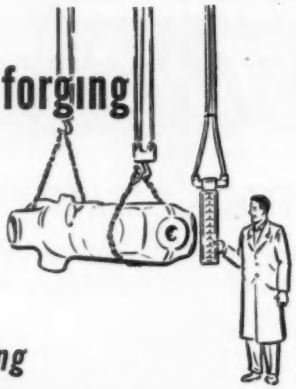
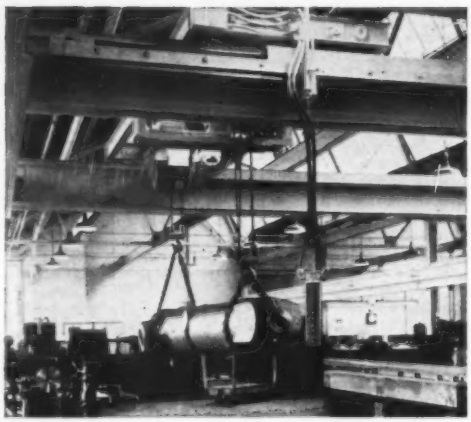
CITY ..... ZONE ..... STATE .....

B-36 shock strut forging



makes two point landing

with R & M **flight control**



At Cleveland Pneumatic Tool Co., one man "flies" these 8400-lb. forgings into position between lathe centers by means of a 10-button "flight control" panel.

This control enables the operator to raise or lower the hooks on the two electric hoists independently or simultaneously a fraction of an inch at a time, and also control the double girder 4-motor overhead traveling crane — a big advantage in handling these giant forgings with a light touch.

Whether you are handling guns or butter, *take it up with R & M.* An expert survey of your requirements by our nearby R & M representative involves no obligation, and usually results in faster products handling — for less money.

Write for Bulletin P71E

TAKE IT UP WITH

ROBBINS & MYERS INC

MOTORS HOISTS CRANES
FANS MOYNO PUMPS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

the factory to the warehouse on conveyors by way of the bridge between the buildings. From the conveyor belts they go into a corkscrew chute that slides them to the lower level. As they descend, they are watched by an electric eye that detects any troublesome blockages. From the chute, a 238 ft long conveyor takes cartons to the sorting room where they are palletized and readied for transfer to storage.

Here, the fork trucks take over. A fleet of nine trucks do the job. The actual storage area measures about 200,000 sq ft, in which are handled about 4,400 different items. *From a news release for Automatic Transportation Co., Chicago, Illinois.*

Radiac Detects Atomic Radiation

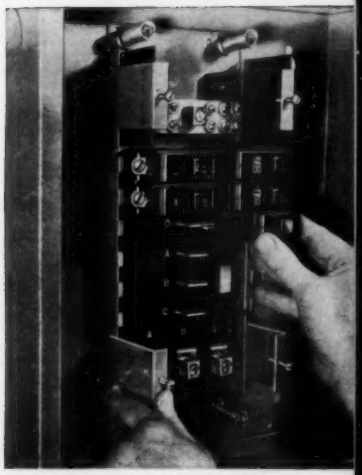
A POCKET-SIZE precision instrument for detecting atomic radiation has been developed by the Navy's Bureau of Ships and the Naval Research Laboratory. This detector, known as radiac, (radioactivity detection, indication, and computation), weighs only 2 lb, whereas equipment now in use weighs about 24 lb.

The new device is housed in a waterproof, shockproof plastic case and is powered by a pair of ordinary flash-light batteries. It is push-button operated, easily maintained, and will instantly indicate, visually, the values of atomic radiation intensities in an area.

The scale reads all the way from 0.005 roentgens per hour to a maximum of 500 rph. The latter would be a fatal dose if exposure were continued for an hour. In the lower ranges of the scale the radiation intensity is also indicated audibly.

Simplicity and portability of the radiac is due to a pair of subminia-

Instrument gives an audible and visual signal of atomic radiation in an area



QUICK-MAKE, QUICK-BREAK PLUG-IN BREAKER—Trumbull's new NLTQ Panelboard introduces the first *plug-in* circuit breaker with quick-make, quick-break operation. Other features: both *thermal* and *magnetic* protection . . . trip-free . . . pressure-type silver-plated copper plug-in contacts . . . all ratings physically interchangeable. Adjacent breakers are on alternate phases—assuring balanced loads and circuits.

New insulating material

KEEPS PANELBOARDS COOLER

The base of this panelboard interior is made of *Plastisol* . . . the first time this amazing plastic material has been used for this purpose.

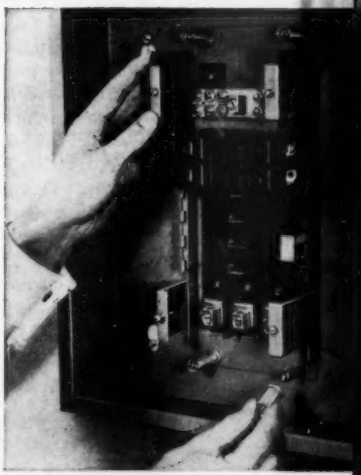
Here are some of the properties which make Trumbull's new NLTQ Panelboard a superior product which will give you excellent service.

Plastisol has very high thermal conductivity and is an excellent radiator of heat. Copper bus bars encased in Plastisol run 10% cooler than in open air!

SUPERIOR TO ALL OTHER TYPES OF INSULATION

Other Plastisol advantages making it superior to all other types of insulation for this purpose include its ability to resist acid and alkali, high temperatures (not harmed at 212 F), tracking and carbonizing. It will not shrink or become brittle, even at minus 30 F.

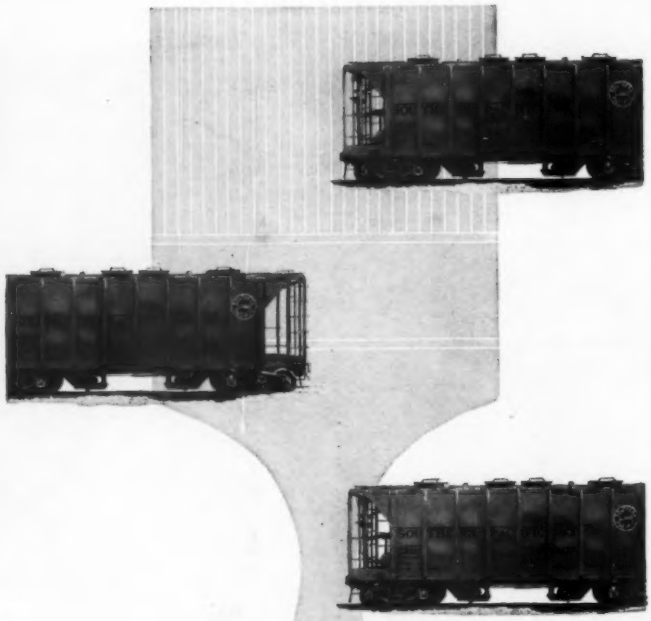
Trumbull's Plastisol base is Underwriters' Laboratories, Inc. approved and endorsed by the Electrical Council.



QUICK INSTALLATION—NO NUTS AND WASHERS—Interior is mounted in box by compression springs . . . which permit easy release for removal. Springs also permit lining up fronts regardless of uneven box installation. Trumbull NLTQ panelboards with lug or circuit breaker mains come in capacities up to 225 amperes in a range of 4 to 42 circuits. Write for Bulletin TEB-14.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.



PROTECTING
Modern Ships of the Desert

Paints based on Parlon (Hercules chlorinated rubber) were used on Southern Pacific hopper cars which carry soda ash and other corrosive bulk chemicals over the hot, dry, alkali flats of the Mojave desert in California.

A paint has to be tough to protect metal against the destructive action of the bulk chemicals and the rigors of such desert conditions. The chlorinated rubber finish of paints based on Parlon is designed to give such protection, even after as long as 32 months of exposure.

Get this double protection of outstanding chemical resistance plus durability for your plants, equipment, and rolling stock by specifying paints based on chlorinated rubber.

Rubber-base Parlon® Paints

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Send further details on Parlon paints and names of suppliers.

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Company.....

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City.....State.....

CR51-2

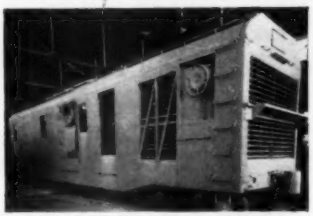
ture tubes. Each is about the size of a cigarette. One is a gas-type Geiger counter tube with enough current output to operate the radiac without the addition of any electronic devices or tubes. The other, a corona voltage regulator tube, provides a stable source of high voltage for the Geiger tube.

Equipment and tubes for the radiac were developed for the Navy by the Anton Electronic Laboratories, Brooklyn, N. Y. *From a release of Dept. of Defense, Office of Public Information, Washington 25, D. C.*

Converted Russians Now Work For Uncle Sam's Navy

DURING WORLD WAR II about 200 mobile diesel power plants, set up in specially built railroad cars, were built in this country for Russia at an original cost of about $100,000 each. Fourteen of these units were undelivered at the end of the war and in 1947 were turned over to the Bureau of Ships. Three were subsequently sent to Turkey.

The Navy is now having these 11 units modified for American service by replacing the original 50 cycle generator with standard 60 cycle equipment, substituting American gauge car trucks and replacing the Russian type couplings. The modification cost ran about $30,000 each.



One of the 600 kw mobile diesel units mounted on special railway car now used by Navy for power emergencies

As modification work is completed, the units are sent to naval stations or bases and kept on a ready status for emergencies. The first 3 units have already been completed and are now at the Charleston Navy Yard.

In addition to these 11 units, the Navy has two 10,000 kw mobile steam power plant units. These were built in 1941 at a cost of $1,250,000 each. Each unit consists of 6 specially built railroad cars. One of the units is at Mare Island Navy Yard and was used four months last year to supply emergency power while the main turbine generator was down for overhaul. In 1948 one of the trains was used in Arizona by the Salt River Valley Water Users' Association to supply power during a severe drought. *From a news release for Bureau of Yards and Docks, Dept. of Navy, Washington 25, D. C.*

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You can minimize procurement problems these days by depending upon your local Fairbanks-Morse Sales Center as a common source for the bulk of your requirements for electric motors, pumps, scales and diesel engines.

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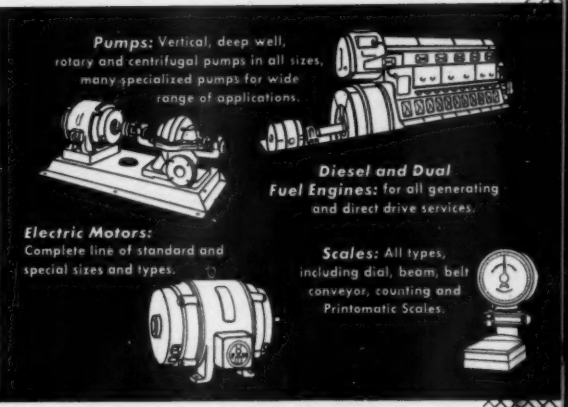
Pumps: Vertical, deep well, rotary and centrifugal pumps in all sizes, many specialized pumps for wide range of applications.
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MAINTENANCE & OPERATION

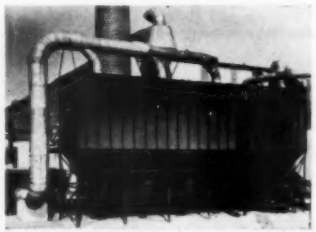
of buildings, utilities and facilities

Air Conditioning System Cleans Air for Re-Use

Contributed by
Dixie Manufacturing Co., Inc.

THE PROBLEM OF removing 80,000 cu ft of dust-filled air every minute, without excessive loss of humidification, heating and conditioning, faced the Southern Shuttles plant of Steel Heedle Mfg. Co. The answer was a dust-collecting system, installed by Dixie Mfg. Co., which filters and cleans the air and then makes it available for re-use through the air-conditioning system to whatever extent that may be required in the plant.

The balance of atmospheric pressure is maintained between the dust removal and air conditioning systems by use of a damper which acts automatically to send air from filters either to air-conditioning system or to the outside atmosphere as required. In addition to the damper arrangement, the building is equipped with louvers in the walls which operate automatically to release air from within the building whenever pressure increases over normal due to excess input of air through the air conditioning system.



Three units like this are returning cleaned and filtered air to the main plant. A fourth unit will be used to return the conditioned and filtered air from their main plant to the new wing

Under normal pressure these louvers remain closed and retain the air within the building. This air is cleaned, filtered, re-conditioned and recirculated, saving fuel and reducing the load on the air-conditioning system. Whenever pressure within the building drops, the louvers open to admit outside air.

Another feature of this installation is a classifier. This is an expansion chamber where the dust-bearing air undergoes a sharp drop in velocity which causes heavy particles to drop, by gravity, into a hopper. The air, with only the finer particles remaining, then enters the cloth tube section which filters out the fine dust. The dust which collects in the cloth tubes is removed by motor-driven shaker action into hoppers below the tubes.

Sawdust, chips, shavings and other wood particles accumulated in the system are conveyed from the collectors to the plant boiler room for use as boiler fuel.

Blank and Form Die Cuts Fabrication Costs

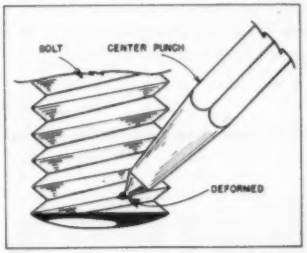
DEVELOPMENT OF a combination blank and form die for a 16 ft Cincinnati press brake has enabled Texas Engineering & Manufacturing Co. to reduce fabrication time on aluminum spray rails for the Lone Star Boat Co. by more than 80 per cent, it was reported recently.

This new die permits the forming of the entire part in one operation as against 11 previously required. At the same time, due to sectionalized construction, the die can be used to form parts of 11 different lengths ranging from 84 in. to about 195 in.

This new die permits forming of the entire part in one operation as against eleven previously required to do job

Tightening Bolts

WHEN TIGHTENING bolts with a ratchet wrench in hard-to-reach places it is often difficult to ratchet the wrench, since the bolt threads do not possess sufficient friction to permit the ratchet to operate. By slightly deforming one of the threads near the point of the bolt with a center punch, sufficient friction can be obtained to overcome this difficulty.



Deformed thread gives desired friction

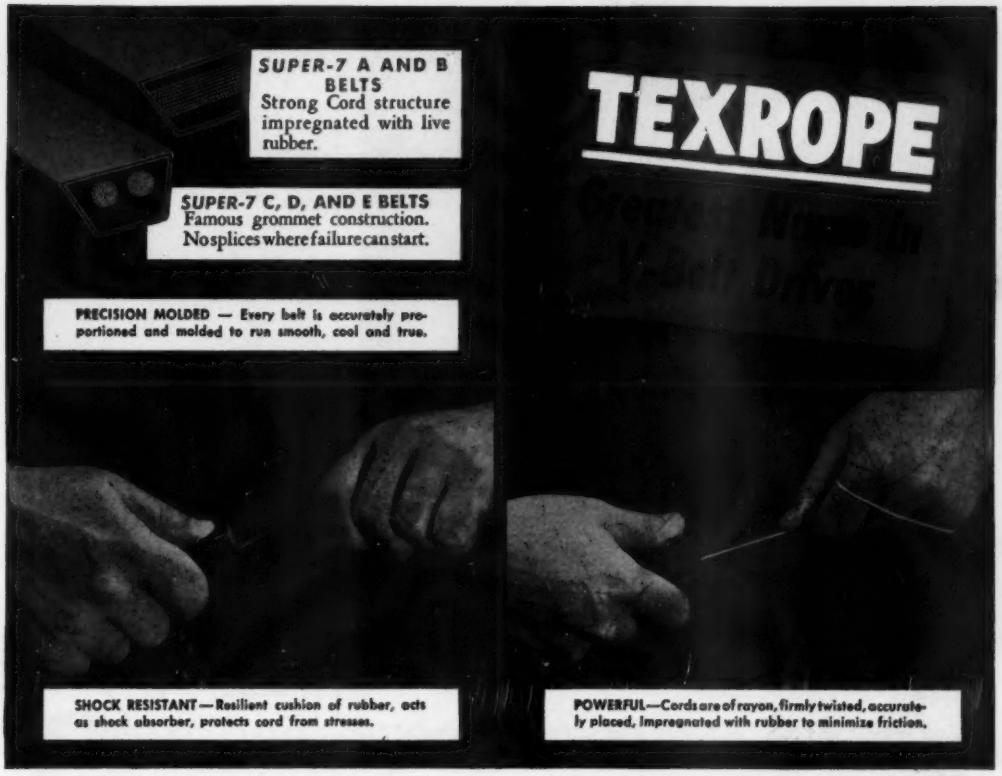
Vapor Barrier for Cold-Water Lines

Contributed by
Industrial Mineral Wool Institute

TO PREVENT accumulation of moisture in insulation when the temperature of the surrounding air exceeds the outside insulation surface temperature, a vapor (moisture) barrier should be installed over the pipe insulation and beneath the finish.

This method was used at the William Penn Hotel in Pittsburgh, Pa., where three parallel cold-water lines were thoroughly insulated to insure long, maintenance-free service in a basement area where surrounding air temperature and humidity is comparatively high.

For each run of pipe between fittings, the inside surface of the molded-type sectional pipe insulation was heavily coated with asphalt emulsion and the sections pressed on the pipe. Adjoining sections were tightly butted together and secured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PRECISION MOLDED — Every belt is accurately proportioned and molded to run smooth, cool and true.
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SHOCK RESISTANT — Resilient cushion of rubber, acts as shock absorber, protects cord from stresses.
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SUPER-7 V-belts give long, satisfactory service even under bad conditions of load, shock and grit.

Tough, double-wrapped cover bias cut for elasticity and impregnated with rubber. Effectively seals out dust, grit, moisture; takes the wear; keeps the belt in shape; and protects cord structure.

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Where space is limited or other special conditions demand heavier duty, the high capacity belt can be furnished in A, B, C, D, and E sections . . . Extra strong cords, special rubber cushion and tough Neoprene cover give them 40% greater capacity than standard belts at proportionately higher price.

V-Belt Drive Headquarters

Your nearby Allis-Chalmers Authorized Dealer or Sales Office can serve all your V-belt needs, whether they be new or replacement V-belts; standard and variable speed sheaves; or speed changers.

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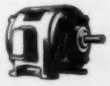

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ½ to 72 in. discharge and up.

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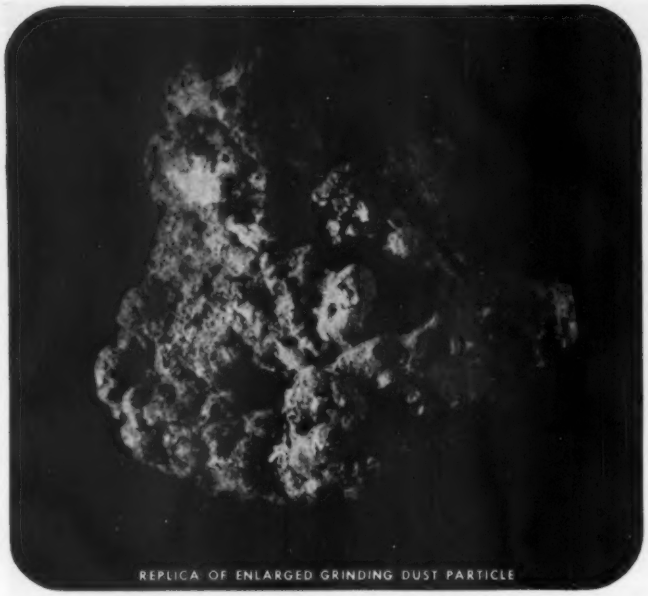

REPLICA OF ENLARGED GRINDING DUST PARTICLE

TROUBLE—MAGNIFIED 3000 TIMES!

Ever wonder why some machines require excessive maintenance? Why they are not as accurate in performance as they are rated?

One vital answer is *abrasive* dust. When uncontrolled, it can attack bearings and other precision machine parts with damaging effects—creating abnormal wear and "sloppy" operation. In addition, safety engineers have long recognized the hazards of abrasive dusts to workmen.

Uncontrolled dust of any type in manufacturing or processing not only is troublesome but becomes a costly problem by reducing operating efficiency of both men and machines.

DRACCO DUST CONTROL EQUIPMENT—backed by over 35 years engineering and manufacturing experience exclusively in dust control—can remove this hazard from your operations. DRACCO engineers will gladly provide you with complete data on high-efficiency DRACCO equipment as applied to your specific problem. Simply write to

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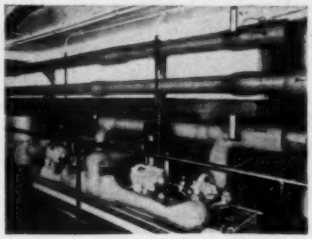
DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

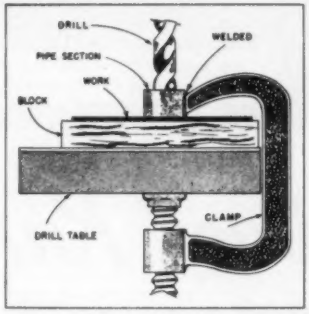
with jute twine spirally wound over the insulation on 4 in. centers.

As a vapor barrier, wax-impregnated paper was then wrapped around the insulation, edges lapped 3 in. and sealed with asphalt emulsion. A hard base for the finish was provided by a layer of rosin-sized paper wrapped and sealed over the wax-impregnated wrapper. Eight ounce canvas was pasted over the rosin-sized paper and two coats of oil paint applied to finish the installation.



Vapor barrier installed over pipe insulation and beneath finish prevents accumulation of moisture in insulation

Handy Drilling Clamp



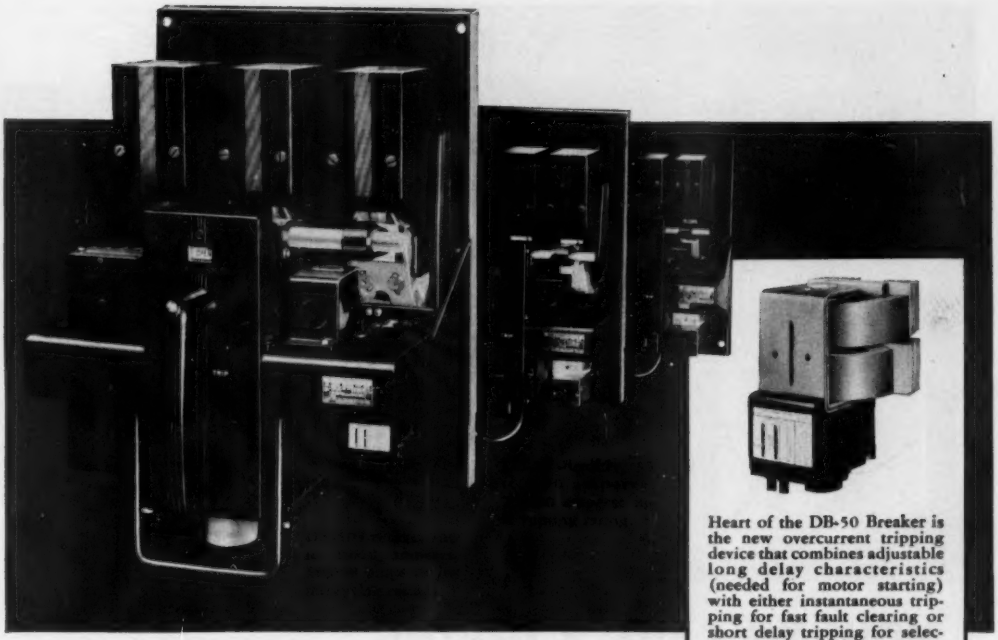
By removing anvil end of ordinary steel clamp and welding on short section of steel pipe, a handy clamp can be constructed for drilling thin metal. This clamp furnishes full support to the metal and helps prevent its distortion

Dunking Device for Cleaning Small Parts

Contributed by Herbert Bouton

SEVERAL HUNDRED small ball bearings were obtained as part of war surplus supplies by a small shop. The shop, however, was unable to clean the bearings, which had been packed for overseas shipment, without using a great deal of labor.

The shop owner hit upon the idea of making a dunking machine. This required a small motor for power. He constructed a wooden frame, as shown in sketch, and a large homemade pulley which was mounted on it. The pulley was to be belted to the motor with as big a speed re-



Heart of the DB-50 Breaker is the new overcurrent tripping device that combines adjustable long delay characteristics (needed for motor starting) with either instantaneous tripping for fast fault clearing or short delay tripping for selective tripping applications.

Now...15,000, 25,000, 50,000 amp.* Breakers *in a UNIFORM DESIGN!*

The new DB-50—most recent addition to the DB line of low-voltage breakers—extends the range of interrupting ratings to 50,000 amperes, continuous current ratings to 1,600 amperes. The co-ordinated design provides uniformity in construction features and operating characteristics, plus a completely flexible overcurrent tripping device.

The ability to close and latch on fault current is the latest and most severe requirement of a modern breaker. This requirement results from delayed tripping schemes designed to provide selective operation. Closely allied is the additional requirement of ability to carry, for periods up to 30 cycles, fault currents equal to the interrupting rating. Contacts, latching mechanism, and closing means of the uniformly-designed Westinghouse DB line of low-voltage air circuit breakers meet these rigid requirements.

The DB-50 has the same desirable unit construction as its smaller counterparts. It is this feature that allows you to add or remove any component as an assembled unit in the field.

Booklets B-4067 on the DB-15 and DB-25, and B-4740 on the DB-50 contain complete information. For copies, call your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

See "Electrical Proving Ground" . . . the dramatic story of the Westinghouse High Power Laboratory in sound and color motion picture. For details, see your Westinghouse representative or write Westinghouse Film Division, Box 868, Pittsburgh 30, Pennsylvania. J-60748

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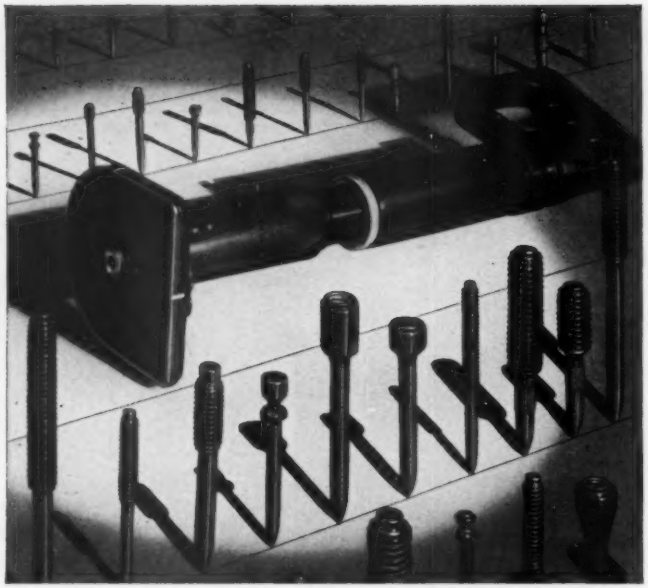
"DE-ION" CIRCUIT BREAKERS



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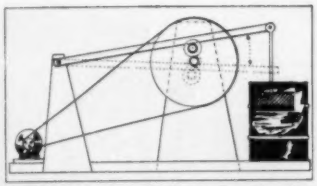


Dunking device which was constructed for job of cleaning small ball bearings

duction as he could get. Unaware that in single belt reduction the ratio should not be greater than six to one, he used a very limber belt directly on his motor shaft and got away with considerably greater ratio, while getting adequate power.

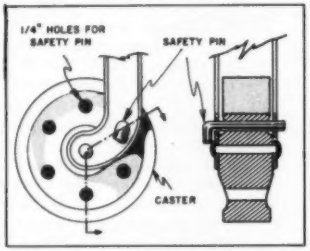
The large pulley was mounted on a large bolt which served as a stationary stud. No shaft or extra bearing was necessary. A crank was added on the pulley and a lever arranged to rest on the crank pin. A basket was suspended from one end of the lever, while the other end was pivoted on a support.

The basket was then moved up and down in the solvent until the bearings were cleaned completely. The operator had only to raise the lever out of the crank's range and change the load when necessary without stopping the motor. After refilling the basket and setting it down on the crank, the operator could go about his other work.

Safety Pin for Casters

Contributed by Paul Tuchek, Allis-Chalmers Manufacturing Co.

A SAFETY PIN device was suggested to prevent metal scaffolding equipped with casters from rolling when in use.



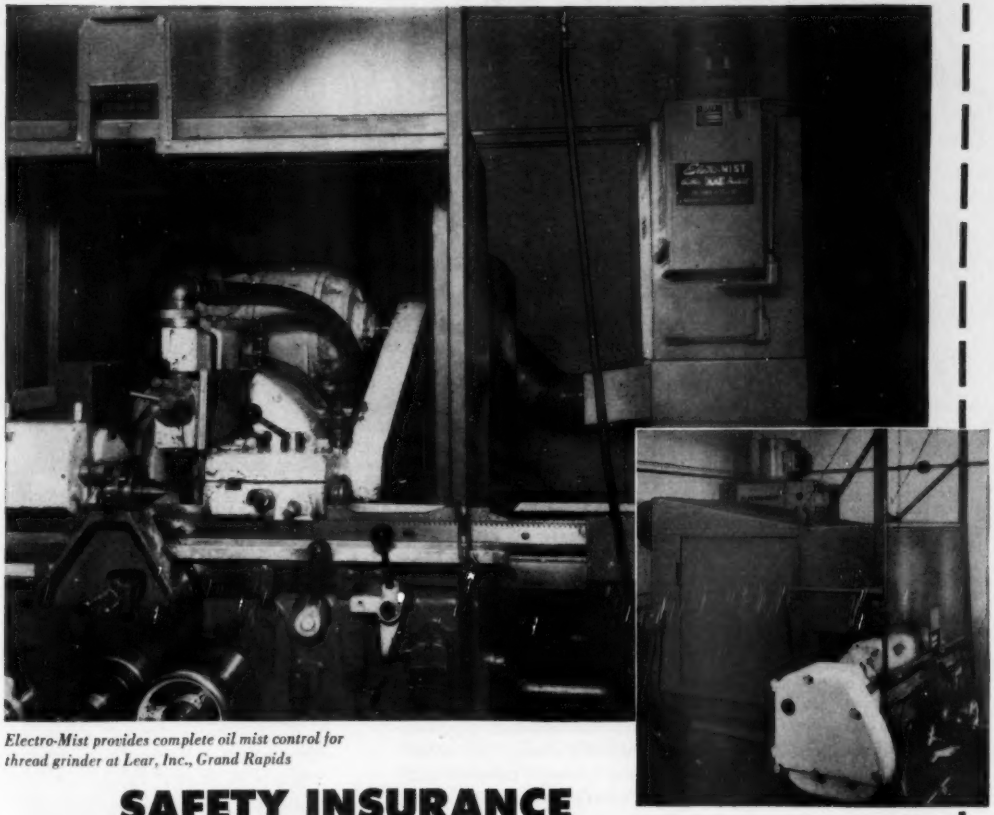
Safety pin device helps prevent metal scaffolding from rolling when in use

Holes ¼ in. in dia were drilled in the casters to accommodate a safety pin. The device is regarded as being safer and more effective than using wooden blocks to keep casters from moving.

Fire-Fighting Pump Basks in Sun

THE PLANT ENGINEERING department of Eastern Air Lines at the Miami Base inherited out-moded fire-fighting pumps and equipment. As the

today's best buy is better air!



Electro-Mist provides complete oil mist control for thread grinder at Lear, Inc., Grand Rapids

SAFETY INSURANCE
for high speed cutting and grinding!

Electro-Mist unit collector eliminates oil mist and smoke at the source.

The hazards created by coolants and the nuisance of oil mist and smoke from high speed grinding and cutting operations are completely controlled by AAF's Electro-Mist collector. A self-contained unit designed specifically for this purpose, the Electro-Mist exhausts material at the source by combining heavy duty industrial filters with electronic precipitation. Its unique design allows easy removal of collector plate assemblies, as well as access to all parts . . . without tools . . . thus reducing maintenance to a minimum.

The Electro-Mist also salvages as much as 2 to 5 gallons of coolant daily in its oil reservoir, which may be piped back into the machine or drained off, as desired. The above illustrations show how the plastic front of the hood may be raised for observation or adjustment, or when lowered, provides complete enclosure for the grinding or cutting operation.

If you are interested in safer, cleaner *high speed* grinding and cutting operations call your AAF representative today or write for complete details on Electro-Mist contained in AAF Engineering Bulletin No. 251.

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with JEFFERSON *Power Circuit* TRANSFORMERS

● The problem of *more production at less cost* to offset lower profit margins, calls for an inventory of methods to assure maximum efficiency and economy. Many manufacturing plants have achieved greater production efficiency along with other economies by installing Jefferson Power Circuit Transformers to provide lower voltage (230/115 volts) from higher voltage (575/460 volts) main circuits.

With Jefferson dry type Transformers all power is brought through one entry and one meter. This economy, plus savings in copper and conduit by running only high voltage circuits throughout the plant, help to slash production costs. Jefferson's Universal Voltage Ratio Design also makes possible three handy combinations, 460/230-230/115-460/115. Mounting may be made on post, walls, or directly on machine tools. Capacities range from 50 V.A. to 15000 V.A. (460/-230V.-230/115V. and 575V.-230/115V.) Sold through electrical wholesalers.

Approved by Underwriters' Laboratories, Inc.

Send today for illustrated Bulletin 501-15

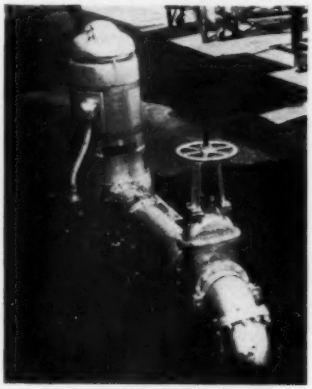
JEFFERSON ELECTRIC COMPANY

Bellwood, Illinois

In Canada: Canadian Jefferson Electric Co., Ltd., 384 Pape Ave., Toronto, Ont.

plant grew, greater capacity was demanded and a new pump was purchased.

The new pump, installed for the fire sprinkler system, pumps 1,500 gpm at 130 psi. It is a deep-well, 4 stage, turbine type unit. It eliminates most of the pipe work and

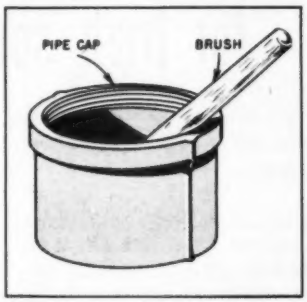


New outdoor sprinkler system pump says good-by to former maze of pipes

does not require a building, for it is already weatherproofed in its own metal housing.

If an emergency fire should break out, this 1,500 gal pump would start to work. If the pressure drops below 55 lb, a 1,000 gal auxiliary pump cuts in, and if that fails to keep the pressure up, a 750 gal capacity auxiliary pump cuts in. Although the old system is kept for stand-by service, all the sprinkler system pumps are on pressure relay and step in if pressure falls.

Pipe Caps Are Handy Receptacles



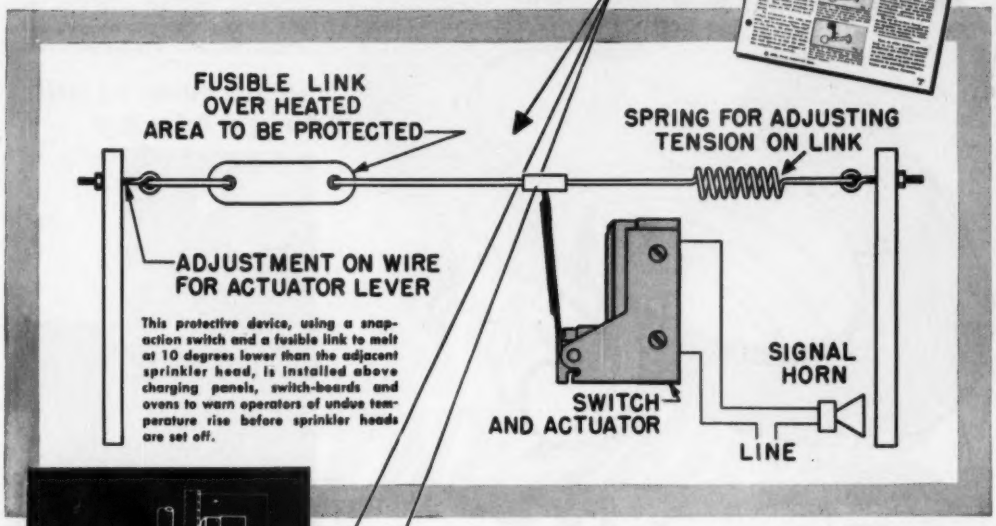
Pipe caps, in sizes above one inch, make handy receptacles for pipe thread compound, graphite bolt thread grease, etc., because their weight and shape make them rather difficult to overturn

Wire Will Secure Fuse Clip

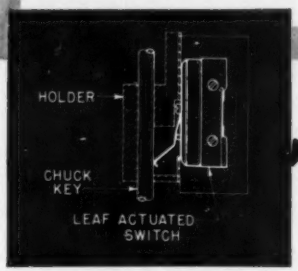
FUSE CLIPS sometimes fail to make good contact with the fuse ferrules, resulting in heating of the clips and drawing of the temper, which may result in poorer contact or needless

READ "MICRO TIPS"

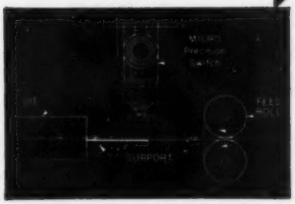
for live production ideas like these



This protective device, using a snap-action switch and a fusible link to melt at 10 degrees lower than the adjacent sprinkler head, is installed above charging panels, switch-boards and ovens to warn operators of undue temperature rise before sprinkler heads are set off.



To prevent starting drill press until chuck key is removed from chuck, circuit is held open by snap-action switch until key is placed in the holder.



An automatic stop for automatic punch press operation uses a snap-action switch to stop the press if stock fails to progress into the die and loops up.

Bring that old equipment back to life with a new automatic control, a new safety limit or a new protective warning device.

That's the way thousands of plant production men are using MICRO snap-action switches to lower production costs in every phase of industry.

"MICRO TIPS"... free to you ... is full of practical time-tested ideas for making present equipment more automatic and for protecting equipment, products and personnel by the use of MICRO products.

Write today and receive "MICRO TIPS" regularly. You'll be glad you did.

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KNIFE-EDGES BITE INTO FLANGE SURFACES

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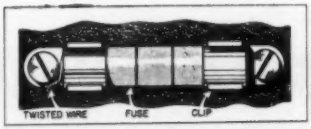


Length of twisted wire around base of clip will increase tension of fuse clip

blowing of fuses. By twisting a short length of about 18 gauge wire around the base of each clip, the tension of the clips and their hold on the fuse ferrules will be increased.

Television Watches and Checks Pouring of Molten Steel

Photo: Diamond Power Specialty Corp.

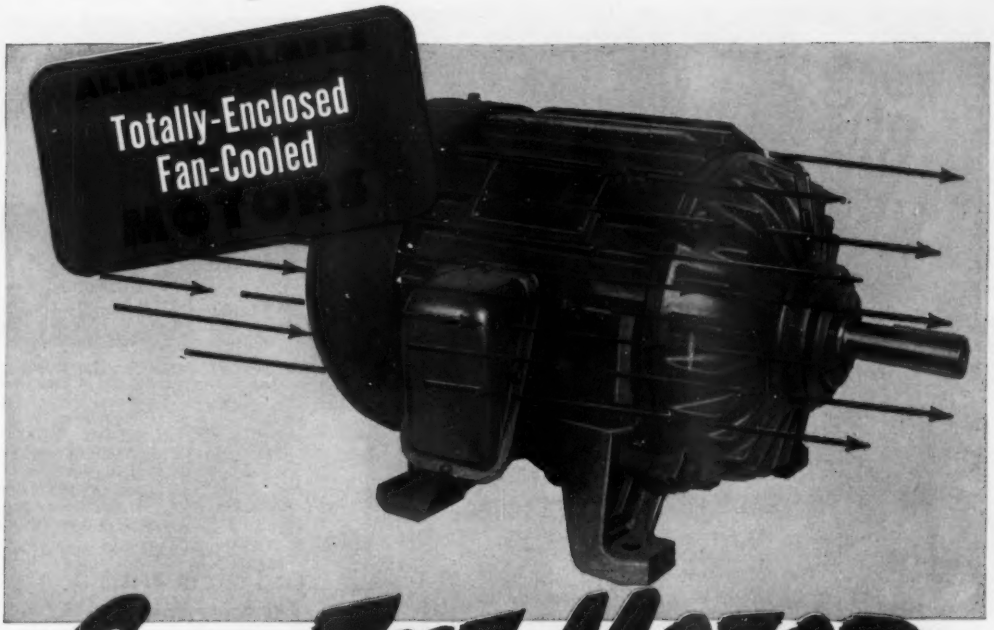
Utiliscope camera (arrow) is focused down on stream of molten steel as it pours into mold for continuous casting of steel billets. Operator, 50 ft away, closely controls the pouring operation

Idea for Routing Machine Saves Man Hours

Contributed by A. J. Calvert, Chance Vought Aircraft

THE COMPANY required a router with a larger throat capacity than was available on any of the existing machines at the plant for making templates with large concave or deep cuts, closed holes, etc. An idea plus a few tools in the plant resulted in a routing machine which is proving very successful for handling this work.

This was accomplished by the use of a hand router which was available in the department. A table was constructed with the router mounted inverted under the table. An arm extending over the top of the table



GET THE MOTOR that Cleans Itself

DROP YOUR MAINTENANCE COSTS to a new low by reducing motor cleaning operations and reducing inspections and overhauls. Tests have proved that on most applications totally-enclosed, fan-cooled motors more than pay back their extra cost in reduced maintenance. And this new Allis-Chalmers Type APZ tefc motor makes maintenance costs lower than ever before on this type of motor.

Here's Why

Concealed air passages and pockets have been eliminated; dirt cannot build up to cause overheating. Cooling air is blown over the ribbed cast iron frame and bearing housings carrying dirt away with it. How about oily dirt that sticks? It can be wiped or blown off without stopping the motor.

Rigid Construction

The frame is rigid cast iron which not only has high inherent corrosion resistance, but also holds bearings in alignment. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZ totally-enclosed fan-cooled motor is built in all NEMA standard frame sizes from 224* to 505. Also in explosion-proof type. Your A-C Authorized Dealer or District Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B6144. A-3398

Sold . . .
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Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors Type APK, also available in frames 203 to 224 inclusive.

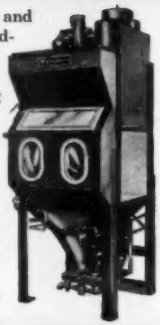
Here's BIG NEWS

Blast Cleaning Unit is PORTABLE!

Ideal for maintenance and many other jobs, including removal of rust, dirt, scale, etc. Economically cleans large objects like tanks, bridges, structural work before painting. Six sizes, stationary or portable, from..... $170.00 and up

Hydro-Finish SPEEDS POLISHING!

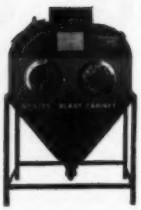
Removes scale, and directional grinding lines . . . prepares surfaces for plating and holds tolerances to .0001"! Liquid blast reduces costly hand cleaning and finishing of molds, dies, tools, etc. Models from $1295.00 and up



STOP DUST at the SOURCE!

Pangborn industrial type Unit Dust Collectors trap dust at source. Machine wear is minimized, housekeeping and maintenance costs reduced. Solves many grinding and polishing nuisances and material losses. Models from $286.00 and up

COMPACT Blast Cabinet for SMALL WORK!



Ideal for producing smooth, clean surfaces on pieces up to 60" x 36" in size. Cleans metal parts, removes rust, scale, grime, dirt, paint, etc., in a few seconds. Saves money all year 'round. Models from $315.00 up

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control Equipment

Pangborn

MAIL COUPON FOR DETAILS

Check for more information

- ☐ Blast Cleaning Cabinets
- ☐ Blast Cleaning Machines
- ☐ Unit Dust Collectors
- ☐ Hydro-Finish Cabinets

PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md.

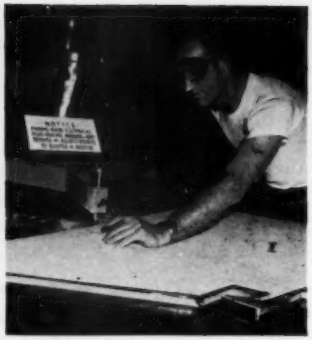
Gentlemen: Please send me more information on the equipment I've checked at the left.

Name.....

Company.....

Address.....

City.....Zone....State.....



Adaptation of router machine is helpful in making templates, also a timesaver

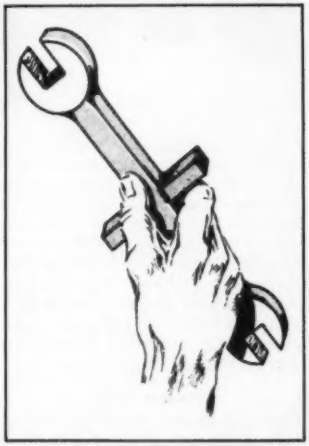
with follower pin to engage in router cutter completed the job.

This method of routing certain work eliminates scribing lines, sawing, filing and shaping templates with hand tools, and hand finishing, resulting in a considerable saving of man hours.

Cross Bars On Wrench Help Save Fingers

Contributed by F. Beshenich, Allis-Chalmers Manufacturing Co.

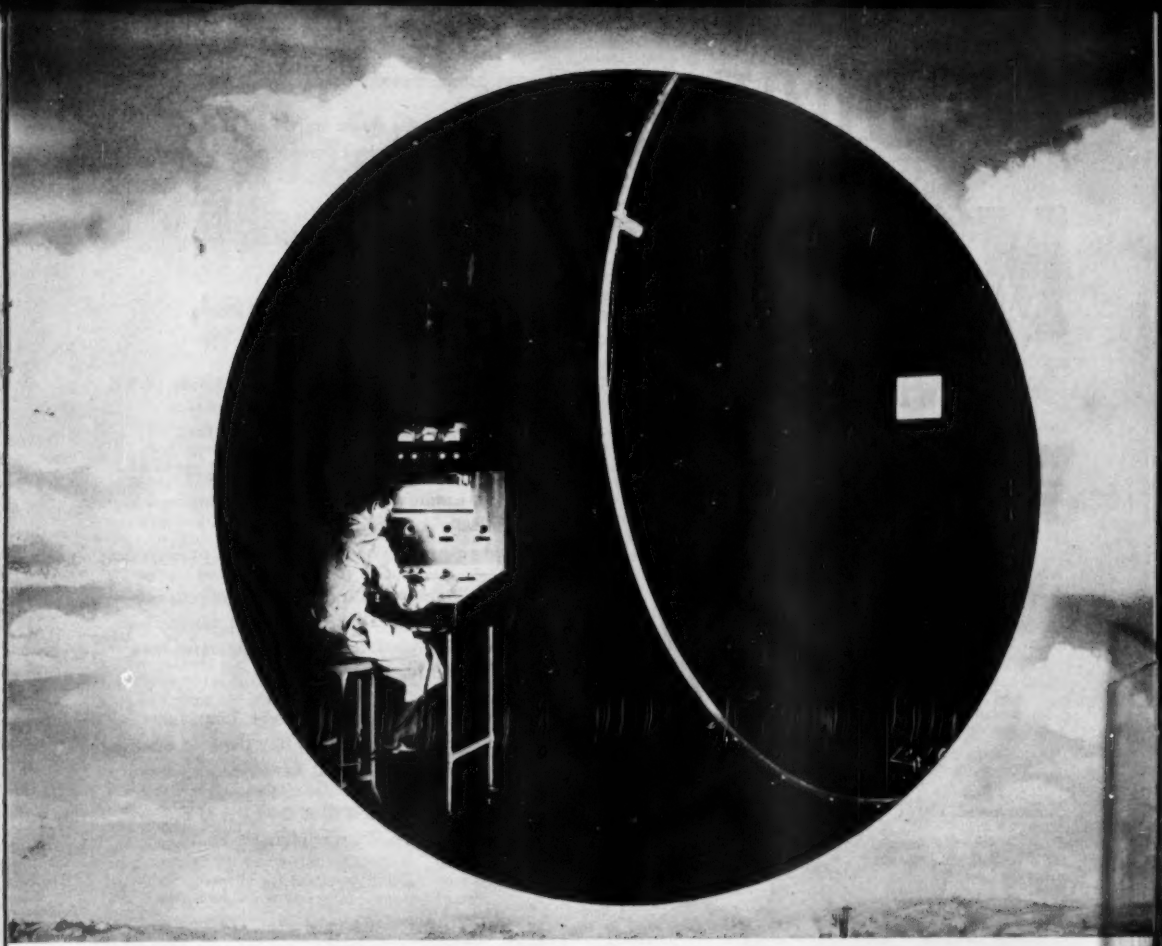
IN PULLING down transformer jobs after assembly, a hazard presented itself for the assembler holding the



Operator's fingers are spared possible injury by welding cross bars to wrench

lower nut on tie rods. These rods are tightened by pneumatic impact wrenches.

To prevent the operator's hand from becoming wedged between the end wrench and the transformer frame, cross bars were welded to the wrench. As a result, these bars hit the frame and protect the fingers of the man holding the wrench.



Operator can set both artificial sun and traveling photocell to any angle or altitude and read resulting light value. All controls work automatically: Readings are taken at high speed and can be recorded electrically.

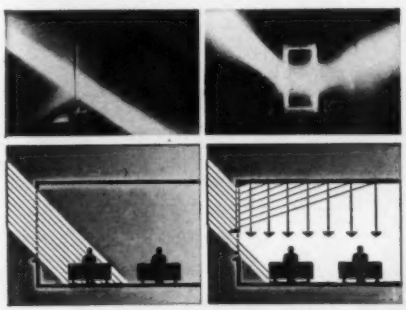
He makes "Daylight" to order for Daylight Engineering study

What happens in a building when the "sun" shines on a light-directing block is measured by the photocell traveling on this hoop. On the other side of the glass block shown in the picture an artificial sun can be set to simulate daylight conditions in any season in any geographical location at any time of the day.

These tests are part of the research-in-daylight program at the Daylighting Laboratory, Engineering Research Institute, University of Michigan, where special projects are set up to study methods of obtaining best quality daylight . . . how to make it do a better lighting job.

One significant better-daylighting result is the development of Insulux Light Directing Glass Block No. 363. This new block controls light so efficiently that a building virtually "turns with the sun." Entire glass areas transmit free daylight from early morning to late afternoon.

A Daylight Engineer will be glad to show you the benefits the new Insulux Glass Block® can bring to your structures. Just write: Daylight Engineering Laboratory, Dept. PE-7, Box 1035, Toledo 1, Ohio . . . Insulux Division, American Structural Products Company, Subsidiary of Owens-Illinois Glass Co.



Direct sun causes uncomfortable brightness near windows, extreme contrast in other parts of room. Insulux Fenestration directs and spreads daylight to ceiling, keeps brightness at comfortable levels.

INSULUX FENESTRATION SYSTEMS

— by the leaders of Daylight Engineering

PRODUCE MORE WITH YARWAYS...

Is higher production your aim?

Then Yarway is your steam trap. Best steam trap performance requires condensate drainage *plus*—

1. **Air and gas removal.**
2. **Velocity scrubbing of condensate from heat transfer surfaces.**
3. **Keeping highest average temperature in the equipment.**

Yarway Impulse Steam Traps do all this, *sending the most premium B.T.U.'s at top temperature into your process or product.*

That's why equipment drained with Yarways gets "hotter, sooner" . . . why better quality and higher production rates are so often reported, and at lower steam consumption per unit produced.

The Yarway "Impulse" design makes this possible—also makes possible small size, only one moving part, straight-through piping, low cost, low maintenance, . . . and it's good for all pressures.

Over 750,000 Yarway Impulse Steam Traps have already been installed. You can buy them at a nearby industrial distributor—216 sell Yarways.

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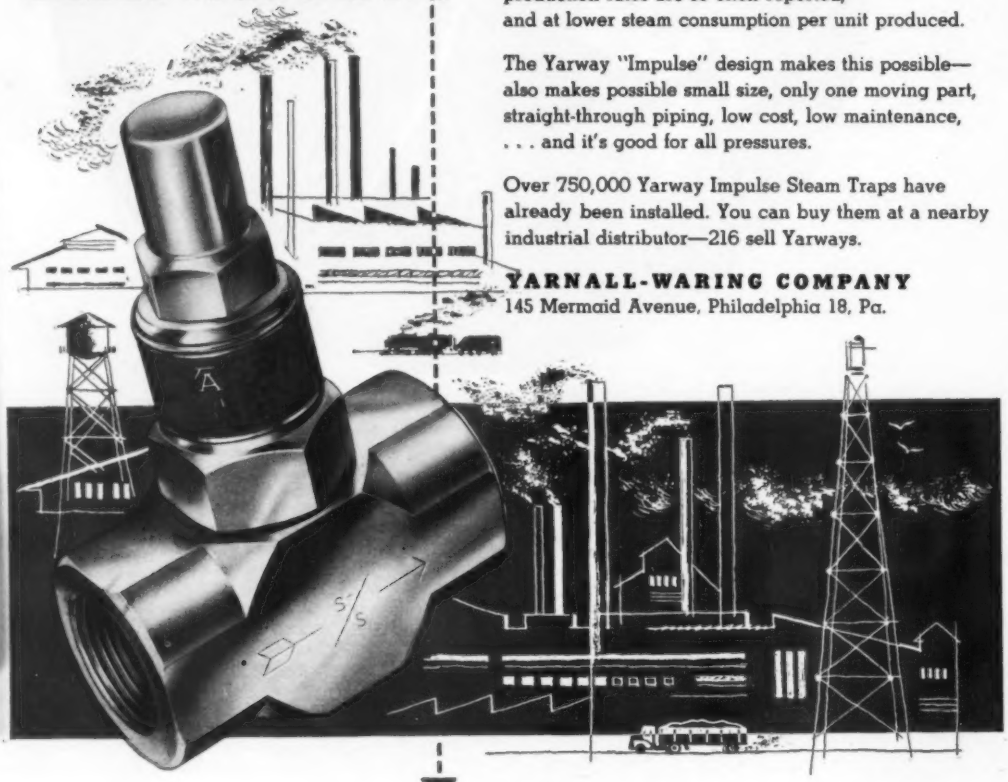


FREE OFFER
Don't take our word for it. Test Yarway's production advantages in your own plant, without cost or obligation. Drop us a card. A trial trap will be delivered promptly.

YARWAY the steam trap designed with production in mind

Parking Lot Layout Is Planned To Handle Large Volume of Cars

The success of this parking arrangement in handling a large volume of cars with minimum damage, supervision and delay has been proved in practice at a plant where 7000 cars were parked . . . Its effectiveness due to several factors: careful planning of angles, spacing and traffic flow . . . Its low cost due to layout, a unique template and gage, concrete chocks and steel pins . . . Advantages of parking arrangement

By V. McCABE, Plant Engineer

THE parking plan diagrammed and described here should be of interest to all industrial plants whether they have old parking lots, parking lots being constructed, or parking lots in the planning stage. Due to its flexibility, simplicity of layout and ease of duplication (because of the template) we have found it to be the most inexpensive to build.

This particular scheme was developed under the author's direction early in 1941 for the Lockland Plant of Wright Aeronautical Corp. when it was found necessary to provide an economical and efficient method of parking 7,000 cars without supervision of the guard force. Furthermore, the lot had to be designed for fast, orderly filling and emptying with minimum risk of damage to the cars.

In developing the idea consideration was given to various methods of parking, i.e.: right angle to bumper rails, and various other angle schemes. We found the 45 deg angle scheme the best arrangement. We weighed the initial cost and upkeep of post markers, pipe rails, timber rails, railroad ties, concrete bumpers, painted stall strips and other factors. The plan finally decided upon was determined to be the least costly and, furthermore, the ideal layout for handling the large volume of cars.

The template, shown in detail in Fig. 2, is responsible for part of the lowered cost of layout and construction. Pins are located easily and driven with the template in position. The concrete chocks are laid directly over the driven pins without need for supplementary fastening.

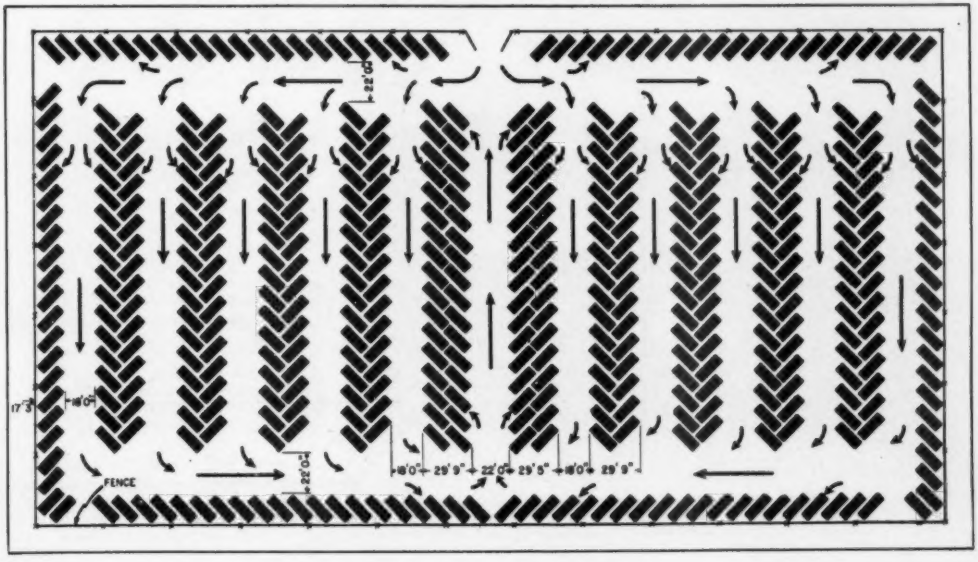
A word of caution about making the template: it must be accurately held to the dimensions specified as it will be used simultaneously as a gage and a template. Both sides of the template should be finished smooth inasmuch as both sides are to be used.

The template, consisting largely of two metal frames with hardwood fillers and braces is constructed as shown in the sketch. The following precautions should be observed: The two frames are to be built of ⅛ in. by 2½ in. cold finish flats and welded as shown. These welds must be ground smooth on each side. Then the boss spacers are welded in place between the two frames.

Next operation is to put on the hardwood braces and the handles. Countersunk rivets must be used to fasten the braces and the frame together. The handle plates are welded to the frame and the handles then welded to the plates. The next job is to fill the spaces between the ⅛ in. flats with 2¼ in. by 2½ in. hardwood and rivet the assembly together.

Last, drill all the template holes 15/16 in. as per drawing and be doubly certain that accuracy is maintained here. This accuracy must also be maintained in holding

Fig. 1. Arrangement, though compact and efficient, permits plenty of space so that cars may be safely parked and removed



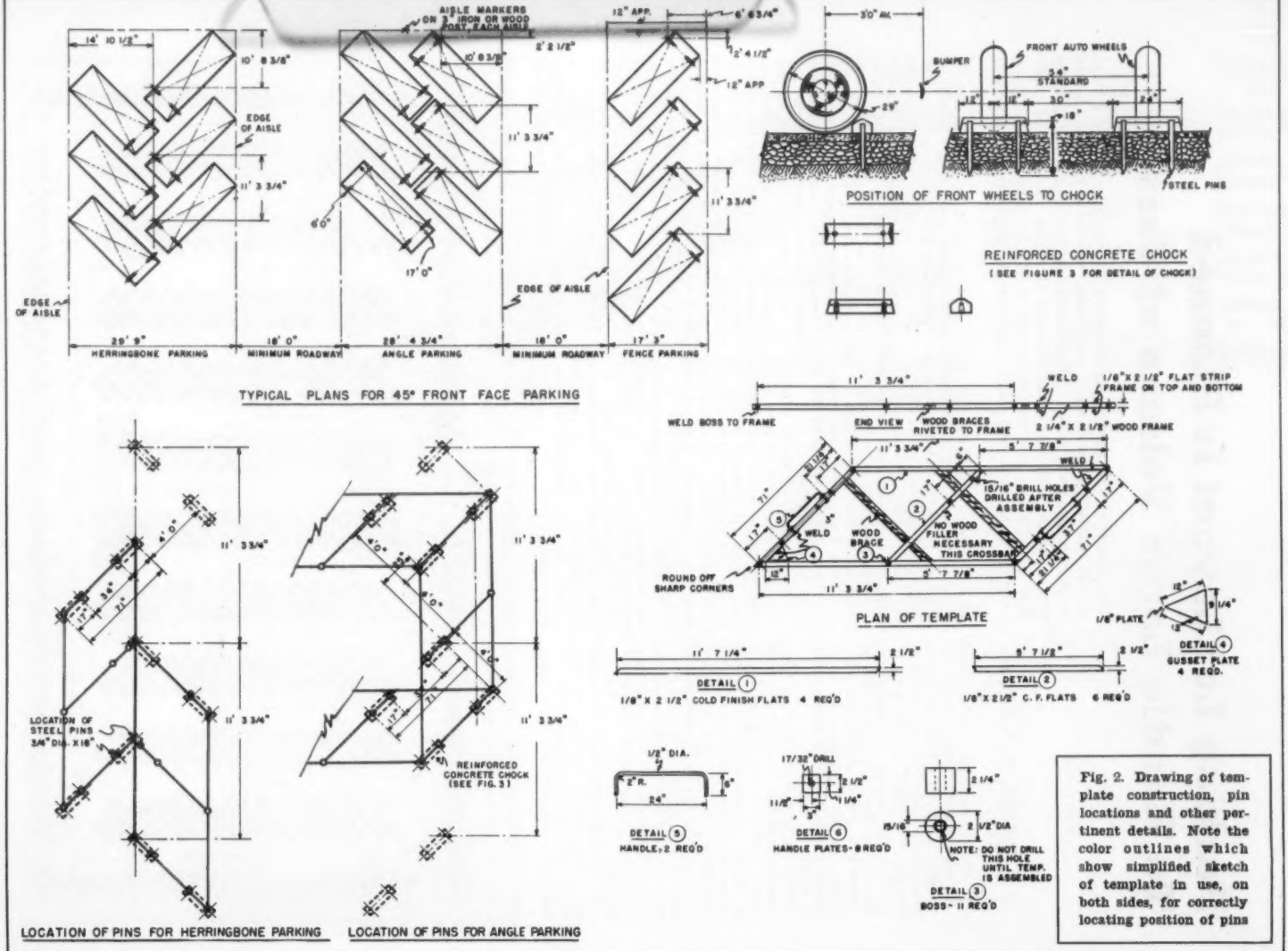

AISLE MARKERS ON 3" IRON OR WOOD POST, EACH AISLE
EDGE OF AISLE
HERRINGBONE PARKING
MINIMUM ROADWAY
ANGLE PARKING
FENCE PARKING
TYPICAL PLANS FOR 45° FRONT FACE PARKING
BUMPER
FRONT AUTO WHEELS
STANDARD
STEEL PINS
POSITION OF FRONT WHEELS TO CHOCK
REINFORCED CONCRETE CHOCK
(SEE FIGURE 3 FOR DETAIL OF CHOCK)
WELD BOSS TO FRAME
END VIEW
WOOD BRACES RIVETED TO FRAME
WELD
1/8"X 2 1/2" FLAT STRIP FRAME ON TOP AND BOTTOM
2 1/4" X 2 1/2" WOOD FRAME
15/16" DRILL HOLES DRILLED AFTER ASSEMBLY
NO WOOD FILLER NECESSARY THIS CROSSBAR
WOOD BRACE
ROUND OFF SHARP CORNERS
PLAN OF TEMPLATE
DETAIL (1)
1/8" X 2 1/2" COLD FINISH FLATS 4 REQ'D
DETAIL (2)
1/8" X 2 1/2" C. F. FLATS 6 REQ'D
1/8" PLATE
DETAIL (4)
GUSSET PLATE 4 REQD.
1/2" DIA.
DETAIL (5)
HANDLE-2 REQ'D
17/32" DRILL
DETAIL (6)
HANDLE PLATES-8 REQ'D
NOTE: DO NOT DRILL THIS HOLE UNTIL TEMP. IS ASSEMBLED
DETAIL (3)
BOSS-11 REQ'D
LOCATION OF STEEL PINS 3/4" DIA. X 18"
REINFORCED CONCRETE CHOCK (SEE FIG. 3)
LOCATION OF PINS FOR HERRINGBONE PARKING
LOCATION OF PINS FOR ANGLE PARKING

Fig. 2. Drawing of template construction, pin locations and other pertinent details. Note the color outlines which show simplified sketch of template in use, on both sides, for correctly locating position of pins

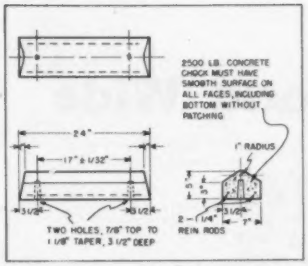


Fig. 3. Details of chock construction

template thickness to 2½ in. All hardwood *must* be used throughout, as must 3/16 in. rivets.

The concrete chocks can usually be made locally to avoid excessive transportation charges. The chocks used at the Lockland plant were made in Cleveland and transported 100 miles to Lockland at a total cost of 70c each. We are, at present, obtaining prices from local concerns for delivery in lots of 1,000.

Some of the advantages of this method of parking, as proved by actual use, are:

1. Drivers may enter and leave their parking berths without undue maneuvering often occasioned by right angle parking in combination with narrow aisles. This avoids delays and damage, by bumping, to the cars.

2. Experience has demonstrated that drivers, almost without exception, register on the pair of chocks and occupy one car space only. When using painted markings, with right angle or any other angle type parking, observation has revealed that nine cars normally will occupy space for ten cars.

3. Parking lots may be emptied rapidly and in an orderly fashion.

4. Cars, as pointed out above, will be parked in a neat and orderly manner without necessity for supervision by the guard force.

5. Fences and other structures are protected from possible damage from traffic by bordering them with parking spots. This does away with the necessity for installing expensive concrete curbs.

6. Safe pedestrian pathways may be provided along fences and structures by bordering the pathways with parking spots.

7. The concrete chocks are so designed that pressure of the car is sufficient to keep them in place.

8. Numbers or names may be stenciled on the inclined faces of the chocks for reserved spaces for visitors or executive personnel. The markings are easily discernible if letters or numerals 2 in. high are used.

9. Complaints regarding bumping, scratching or other types of damage were practically nil. Experience has proved that the spacing between cars is entirely adequate.

Germ-Killing, Sun-Bathing in Westinghouse Office

DEVELOPMENTS in office technique are occurring rapidly. For example, the new Merchandise Mart offices of Westinghouse's Northwestern District Headquarters, is bathed in artificial sunlight the year around. See the photo at right.

Other features include: germ-killing Sterilamps installed in the ventilating system (see photo below); bright colors on the walls to provide cheerful surroundings; acoustical soundproofing, complete air conditioning; planned fluorescent lighting.

A total of 220 of the new type sunlamps, developed recently, are installed on the ceiling over all working areas. Over the general offices the lamps produce, in an eight-hour day, the equivalent of 15 minutes in the summer sun. In private offices, where the executives are away from their desks more frequently and often out of town on business trips, concentrating reflectors aim the fluorescent sunlight in stronger doses. These units can give a sun tan in several hours if the occupant of room chooses. They can be turned off or on at will.

To complete the job, Westinghouse has met the "morning coffee" problem by installing a small cafeteria in the midst of the office. No claim is made to having introduced anything new. All the modern developments have "just been put together in one place."

Germ-killing lamps, reported to effect a 90 to 98 per cent kill, installed in the plenum chamber for incoming conditioned air, free air of any bacteria

General office areas, such as this one, are flooded with sunlight by the tubular fluorescent sun lamps (arrows). These ultra-violet sunlamps provide, in an eight-hour day, the equivalent of 15 minutes of basking in the summer sun

The Plant Engineer—World Wide

Exchange of greetings and ideas between plant engineers of the United States and of the United Kingdom emphasizes the international aspect of the profession and the common bond between plant engineers wherever industry flourishes throughout the world

PLANT ENGINEERING is no new profession. It existed during the building of the Pyramids, a feat of scientific skill which has probably never been surpassed. There was, of course, the designer; there was someone to decide upon the method of construction and however elementary the tackle used. . . . This plant engineer had no title that we know of, but carried out his duties in a quiet, efficient manner.

"So for centuries the profession has grown from strength to strength, becoming more impelling, until not many years ago this force, as yet dispersed, became at last united in this Institution.

"Today the profession is firmly established and by the awareness of its existence realizes the gravity of its responsibilities. This is a challenge to every member which must be met by courage and determination.

"The policy of mere make do and mend so often credited to those who have to keep the wheels of industry turning, is fast disappearing. In its place a new and constructive approach is being built up. It is now realized that the plant engineer can give his best service by applying his practical knowledge at the design and development stage to use it to best advantage.

"The conditions in which we live have changed drastically in the industrial world since before the last war. . . . Great strides have been made in these post-war years and the level of output per man-year has risen considerably. Once more, however, we shall again have to divert a growing part of our efforts to rearm.

"Sections of most factories will in due course be switched from normal production to special work, absorbing quantities of labor and materials usually engaged in earning the country's living. This will call for a special part to be played by plant engineers and will bring with it a magnificent opportunity for them to show their true worth, for apart from rearmament we must maintain essential products. This can be done only by continuing the upward trend of productivity. . . .

"For the plant engineer in particular this means first class maintenance and a continued advancement in the efficiency of all new plant. It means too the development of a wider appreciation of the financial and economic aspect of production.

"Throughout industry generally, the call is for a keener sense of urgency; the building up of a higher code of co-operation and reliability, coupled wtih a full appreciation of time. These factors are absolutely essential if the new high demands for re-armament and production are to be met. The plant engineer will carry his full share of the burdens which lie before us."

The above quotation is from an address by D. Lacy-Hulbert upon the occasion of his installation as fifth president of the Institution of Incorporated Plant Engineers at Buxton (see pages 59-65 of the June issue) on May 23. Recently appointed Joint Managing Director (Technical) of the Chesterfield Tube Co., Ltd., a subsidiary of Tube Investments, Ltd., Mr. Lacy-Hulbert is in the unique position of knowing at first hand the current demands of industry and the part that the plant engineer must play in meeting those demands.

Those demands, and the related responsibilities of the plant engineer, today are dominant in every nation of the world. Some day the plant engineers' role will be equally important in the reconversion to peacetime activities and, following this, in the struggle for lower costs in a free and competitive market.

Thus the Presidential Address is more than a statement of fact, it is a ringing challenge for the plant engineer to meet the demands of an increasingly complex industry, a challenge to all plant engineers of the world, wherever industry is a factor in the national economy.

As a profession, plant engineering knows no national boundaries. This is obvious when one considers the nature of the activities, the common elements between industries and the kinship in the profession unequalled by any other branch of engineering. This fact was, however, emphasized at the convention where plant engineers of different countries discussed problems common to all.

A glimpse of the typical plant engineer in Great Britain and his problems is given in the article on page 62 of the last issue. A more complete report of the conference will appear in the next issue.

This is to mark the happy occasion

of the visit of

Mr. RICHARD H. MORRIS, M.I. PLANT E.

Editor of 'Plant Engineering', Chicago

to the 4th Annual Conference of the

INSTITUTION OF PLANT ENGINEERS

and to convey the warm greetings

and good wishes of the Conference

to our other American Members

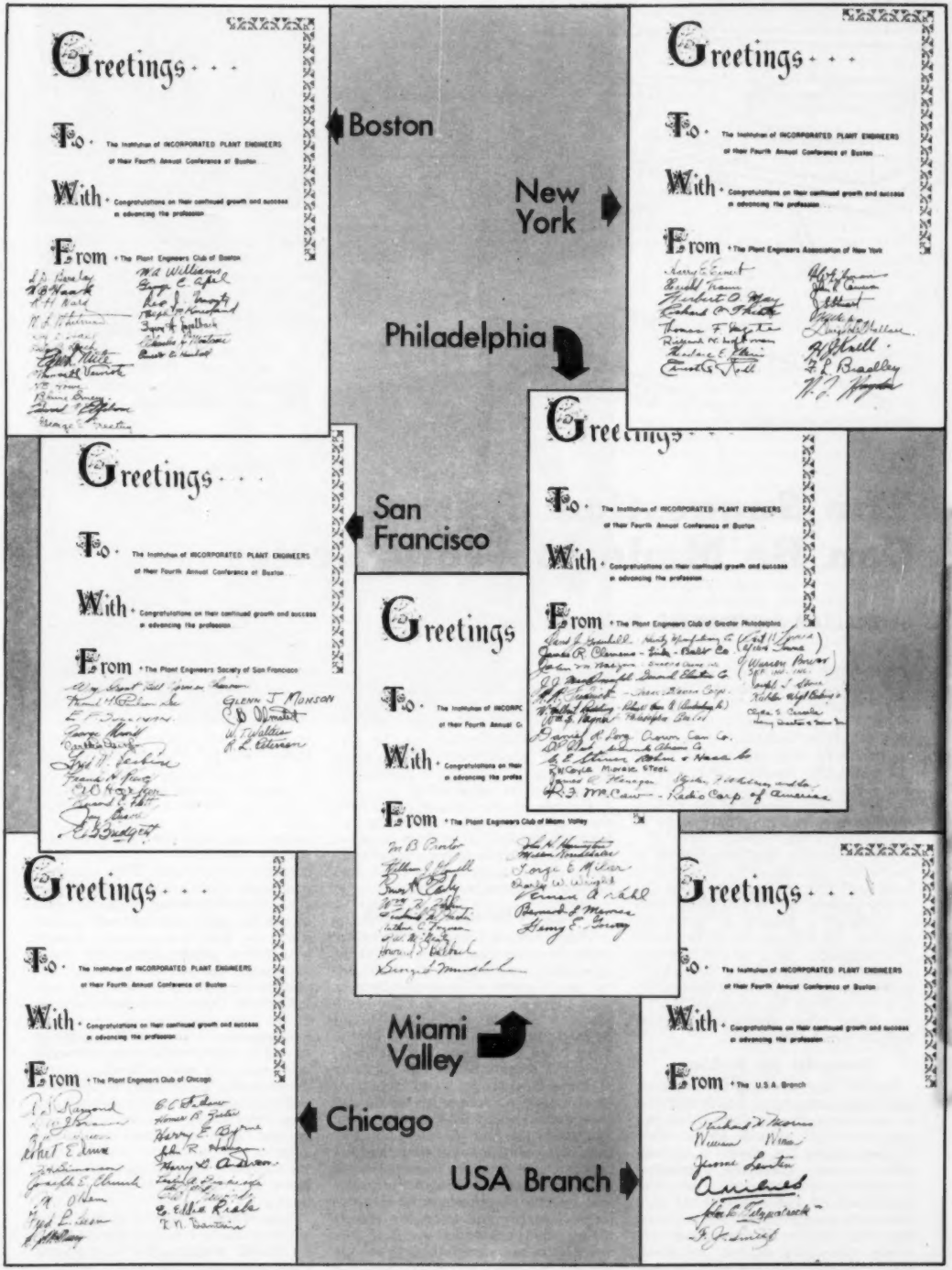
and the

Plant Engineering profession

of the United States

BUXTON, DERBYSHIRE, ENGLAND MAY, 1951

Official greetings from the assembled conference of the Instit. of Plant Engineers to all American plant engineers


Greetings
To · The Institution of INCORPORATED PLANT ENGINEERS at their Fourth Annual Conference at Boston
With · Congratulations on their continued growth and success in advancing the profession
From · The Plant Engineers Club of Boston
Boston
New York
Greetings
To · The Institution of INCORPORATED PLANT ENGINEERS at their Fourth Annual Conference at Boston
With · Congratulations on their continued growth and success in advancing the profession
From · The Plant Engineers Association of New York
Philadelphia
Greetings
To · The Institution of INCORPORATED PLANT ENGINEERS at their Fourth Annual Conference at Boston
With · Congratulations on their continued growth and success in advancing the profession
From · The Plant Engineers Club of Greater Philadelphia
San Francisco
Greetings
To · The Institution of INCORPORATED PLANT ENGINEERS at their Fourth Annual Conference at Boston
With · Congratulations on their continued growth and success in advancing the profession
From · The Plant Engineers Society of San Francisco
Greetings
To · The Institution of INCORPORATED PLANT ENGINEERS at their Fourth Annual Conference at Boston
With · Congratulations on their continued growth and success in advancing the profession
From · The Plant Engineers Club of Miami Valley
Miami Valley
Chicago
Greetings
To · The Institution of INCORPORATED PLANT ENGINEERS at their Fourth Annual Conference at Boston
With · Congratulations on their continued growth and success in advancing the profession
From · The Plant Engineers Club of Chicago
USA Branch
Greetings
To · The Institution of INCORPORATED PLANT ENGINEERS at their Fourth Annual Conference at Boston
With · Congratulations on their continued growth and success in advancing the profession
From · The U.S.A. Branch

Greetings from the Plant Engineers' Clubs of the United States to the Incorporated Plant Engineers on the occasion of the Fourth Annual Conference held in England during the month of May with representatives of the profession around the world

Cartoon: Courtesy, Muzak Corp.

Many workers know what the problems are in their particular jobs; very few know the solutions . . . Does your company pay for, or consider, suggestions which cover the problems only? Or do you insist on the answer, too? . . . If you have skilled process or methods engineers on the payroll why not let the employees put them to work on problems usually known by the man on the job?

The Suggestion System Can Be Made to Work Better

By WILLIAM J. O'CONNELL, Process Engineer

ON THE BASIS of results, the suggestion system is here to stay. There is no doubting the efficacy of the system and the fact that, wherever installed, it has paid for itself over and over again. There is a possibility, however, that a great many times management is not receiving the full benefit of the system because the "warning flag" type of suggestion is overlooked.

The "warning flag" suggestion is one where a problem or situation is presented that management was not aware existed, but is presented with or without a logical or workable solution. In the case of an unworkable suggestion, it is all too common a procedure to reject it summarily and to ignore the problem presented. It is by making use of these "warning flags" that suggestion system benefits can be increased.

Recognize the Problem

Rather than stressing the solution, one midwestern plant has found that by educating the employe to recognize a problem as such, the number of suggestions has shown a noticeable increase. Then, the suggestion is investigated not only from the standpoint of the solution but also from the standpoint of the existing situation. If this is something that needs correcting it can be done, even though the suggestion presented is not the logical solution.

The big result of this effort is that a great many situations are found that need correcting. They would not have been discovered through normal channels. No plant engineer and his subordinates can be expected to know every shortcoming in the plant. The same holds true for production supervision.

But not for the man on the job. If there is something wrong the operator will know it. If a process is not safe, the man running it realizes the fact. If an operation can be improved the same holds true.

Biggest Group Unreached

There are, however, very many more persons who know that there is something wrong with their job but don't know what to do about it, than there are those who have remedies to suggest. An effort should be made to reach this greater group. Very often a workman will hesitate, for some reason, to tell his superior of some flaw or defect or oversight in an operation where he would not hesitate to submit it as a suggestion. By stressing the problem, rather than the solution, this man will be reached. He must be shown that if there is no prior claim to the problem by one of the planning departments, his remuneration for recognizing the problem, even if his solution is not acceptable, is recognition by the company for his alertness.

One eastern company learned the hard way the fact that a problem, even without a logical solution, is still a problem. In their assembly department they had installed a number of air driven screw drivers, chain mounted from overhead, with a counterbalance to return the driver to a raised position after the operation. With a model change, a light driver was replaced with a heavier one, and the counterbalance weight increased, but the chain strength not changed. With the more powerful driver, the twist of the shaft when the screw bottomed was increased, and one operator recognized the fact that a wrong torque adjustment might break the chain and send the driver spining. His suggestion was as follows:

Present: Operation unsafe because of too light chain.

Suggestion: I suggest that a safety spring be installed to prevent handle from spinning and striking operator if counterbalance chain breaks.

This suggestion was received and then circulated among interested parties. Their comments are as follows:

Foreman: Idea is not practical. Have had no accidents up to present time.

Supervisor: A safety of this type will not work. I realize these chains do break occasionally, but there have been no accidents.

Safety Department: No accidents have been reported on this opera-

Photo: Courtesy, Syntron Company.

A suggestion to eliminate hand-feeding of two centerless grinders opens the way for use of a vibratory parts feeder as illustrated here. The original suggestion was complicated but it served to indicate that there might be an easier and cheaper way to do the job. One operator now can do the work of two and the suggester was paid off as if he had submitted the workable solution to problem

tion. Safety idea does not appear workable.

A short time after these comments were returned to the suggestion committeeman, he received the following memorandum from the production foreman: "Man was hit when chain broke today."

Luckily, there was no injury, but the occurrence caused this one plant to change its acceptance of suggestions from the merely workable ones to those which also appeared to present a problem that needed correction. In this case, a process engineer was assigned to the project, he arrived at a workable solution, and the original suggestor was paid as if he had submitted the idea, instead of just recognizing the hazard. Since that time they have been very successful, through an equitable method of payment, in reaching a greater number of employes.

An excellent example of reaching the man who recognizes the problem, but does not necessarily have the solution will be shown in the next example. It is a suggestion from the files of a plant that, through a thorough education of the men directly concerned with commenting on suggestions, have learned to recognize and utilize their men's observations.

The situation revolved around two centerless grinders doing a finishing operation on a small part. The suggestion follows:

Present: There are two operators on two centerless grinders. One keeps them running, and a second person feeds them by hand.

Suggestion: I suggest we put an automatic feeder here, and eliminate the second operator. I have designed one and made up the principal parts. I have tried it to make sure the idea would work. I am enclosing a sketch with the suggestion, and will show you the parts when you want to see them.

A letter acknowledging receipt of the suggestion was made, and the suggestion and its sketch sent to interested parties. Their comments follow:

Foreman: This is an operation that could very well benefit from an automatic feeding arrangement. It is quite possible the accompanying suggestion is too elaborate, but I believe an investigation should be made into the matter.

Production Superintendent: This suggestion, with considerable processing might be made practical. I believe if an automatic feeder is used, a less complicated system could be developed. However, as a result of this suggestion, our processing department will investigate the possibilities of automatic feeding in this operation.

As a result of this, the following letter was sent to the suggester:

"Dear Sir: Thank you for your suggestion relating to automatic feeding on the centerless grinder.

After investigating your suggestion, the committee feels that your idea for an automatic feeder for this operation has a great deal of merit and, although your solution shows ingenuity, it is believed possible that a simpler arrangement can be developed. However, since your suggestion preceded any work along these lines we are holding it in our "open" files. If a successful feeder is developed, your suggestion will then be considered as the initiating factor.

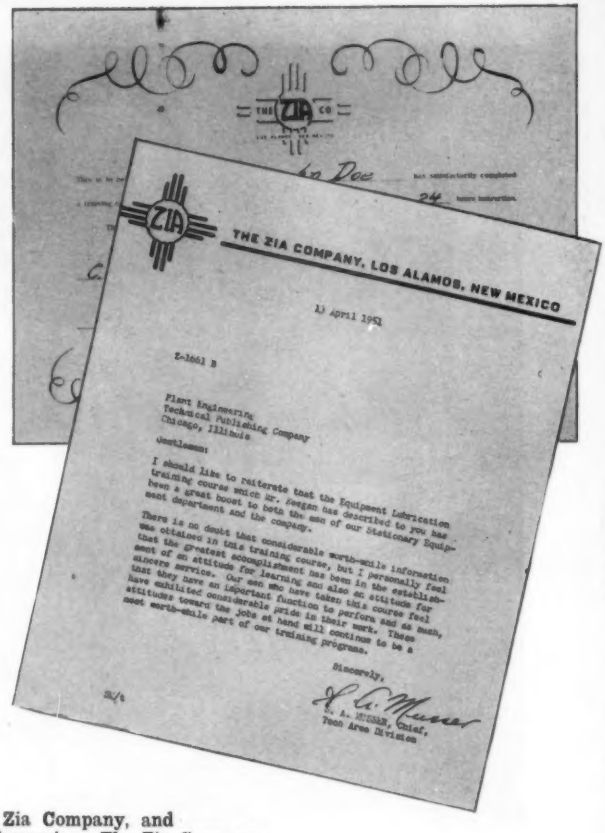
(Signed) Chairman, Suggestion Committee

As a result of this suggestion a vibratory parts feeder was deemed the most logical method of supplying the parts to the machine. The equipment was purchased and installed and the suggester was paid off as if he had suggested the final arrangement.

By educating the supervisors to recognize the condition, as well as the suggestion, this plant has reaped additional benefits from its suggestion system. The man who suggested the automatic parts feeder has a greater confidence in his foreman, he feels as if the plant has his interest at heart, and through his experience he will have the incentive to keep his eyes open for other suggestions as well as inspire his fellow workmen to do the same. In addition, undesirable conditions are being uncovered that would otherwise have continued for some time.

Problems Worth Money

When the suggestion system is expanded to accept the problem as well as the suggestion, inevitably the plant engineering department assumes a definite place as an auxiliary to the system. At the same time, since improvement of processes is a function of the plant engineering department, or whatever it may be called in any particular plant, the more the suggestion system aids this function, the more it becomes a process auxiliary.


THE ZIA CO

THE ZIA COMPANY, LOS ALAMOS, NEW MEXICO

13 April 1951

Z-1661 B

Plant Engineering
Technical Publishing Company
Chicago, Illinois

Gentlemen:

I should like to reiterate that the Equipment Lubrication training course which Mr. Keegan has described to you has been a great boost to both the men of our Stationary Equipment department and the company.

There is no doubt that considerable worth-while information was obtained in this training course, but I personally feel that the greatest accomplishment has been in the establishment of an attitude for learning and also an attitude for sincere service. Our men who have taken this course feel that they have an important function to perform and as such, have exhibited considerable pride in their work. These attitudes toward the jobs at hand will continue to be a most worth-while part of our training programs.

Sincerely,

S. A. Musser, Chief,
Town Area Division

Certificate issued to men completing course; and letter from S. A. Musser, commenting on effectiveness of course which is one of several maintenance courses conducted by Zia

Lubrication Training Helps at Los Alamos

Though faced with unparalleled problems in maintenance and lubrication, this company has discovered that well planned courses can equip mechanics for work on complex equipment . . . Manufacturers help

By G. E. KEEGAN, Training Supervisor, The Zia Company, and W. D. THORNTON, Stationary Equipment Supervisor, The Zia Company

AT LOS ALAMOS, New Mexico, The Zia Company is a prime contractor to the Atomic Energy Commission, performing maintenance and repair work in addition to utility and community operations. The variety of functions and complex nature of the work performed by Zia is a challenge to experienced craftsmen who have been selected from all parts of the country. Recognizing the factors of isolation (7500 ft-above-sea-level and hundreds of miles from a similar operation) and rapid advances in technical fields, The Zia Company began planning a comprehensive training program in the spring of 1949 to offer its personnel an opportunity to develop additional skills, keep abreast of new developments and increase their knowledge.

Electricians, plumbers, welders, utility men, gas and heating mechanics, auto mechanics and carpenters enrolled in courses in September, 1949, and by the following May more than 13,000 student hours had been recorded. Participation in all courses was voluntary and conducted after regular working hours. The interest shown stimulated the establishment of more advanced courses of study in September, 1950, which includes electronics, heating controls, combustion control, equipment lubrication, vehicle inspection and lectures on welding theory and metallurgy.

Indoctrination, Supervision

Technical Instructors range from Foremen, Superintendents and Engineers of The Zia Company to Engineers and Physicists of the Los Alamos Laboratories and all are certified by the New Mexico State Department of Vocational Education. Indoctrination training and courses in supervision are part of the over-all program and the University of New Mexico conducts courses in accounting at Los Alamos as the demand arises.

The cooperation of manufacturers whose equipment is in operation at this atomic installation has aided greatly in keeping the training alive and interesting. At our request, manufacturers from New York to San Francisco offered the services of their finest technical representatives to participate in appropriate parts of the training courses. Lectures, slides, mechanical displays and instruction manuals on specific types of equipment are featured in an organized approach to training which interests experienced journeymen. More than fifty guest speakers have conducted technical discussions and in excess of 100 manufacturers have contributed films and literature of a technical nature.

To illustrate, the Equipment Lubrication Course will serve as an example in this article. A relatively short course, lubrication consisted of twenty-four hours' instruction for a group of twelve mechanics, and was taught by W. D. Thornton, Stationary Equipment Supervisor of The Zia Company. The course included a study of the following subjects:

1. **History and Development of Lubrication.**
2. **Classification of Lubricants.**

Oils	Greases
Naphthenic	Cup type
Paraffin	Fibrous type
Regular	Metallic Soap
(Premium and Heavy Duty)	Mixed Soap
	Silicones, etc

3. **Determining Methods of Lubrication.**
   (Type of bearing used—supplying and retaining lubricants—load and speed on bearing.)

4. **Specifications of Lubricants.**

Oils	Greases
API Gravity	Penetration
Viscosity	Carrying Medium
Flash Point	Viscosity
Fire Point	E. P. Rating
Neutralization	Dropping Point
Extreme Pressure	Maximum Usable
Steam Emulsion	Temperature
Corrosion	
Uniformity	

5. **Lubrication as Most Important Factor in Preventive Maintenance.**

6. **Lubrication as It Affects Costs.**

7. **Lubrication Systems.**
   A. Forced Feed — C. High Speed
   B. Splash System — D. Low Speed

8. **Lubrication of Air Compressors.**
   A. Sizes — D. Bearings
   B. Types — E. Lubricants to Use
   C. Speeds — F. Schedules

9. **Operation and Maintenance of Vacuum Pumps.**

10. **Lubrication of Machine Shop Equipment.**

11. **Lubrication of Overhead Cranes.**
    (Open gears—cables—reduction gears and bearings.)

12. **Lubrication of Blowers.**

13. **Operation and Maintenance of Diesel Engines.**

14. **Use of Additives.**

J. N. Shuffler, a representative of the Texas Company, R. L. Rominger, Wynn Oil Company, F. C. Humphreys, Combustion Engineer, and S. A. Musser, Technical Area Division Chief of The Zia Company, participated as guest speakers throughout the program.

Reference File

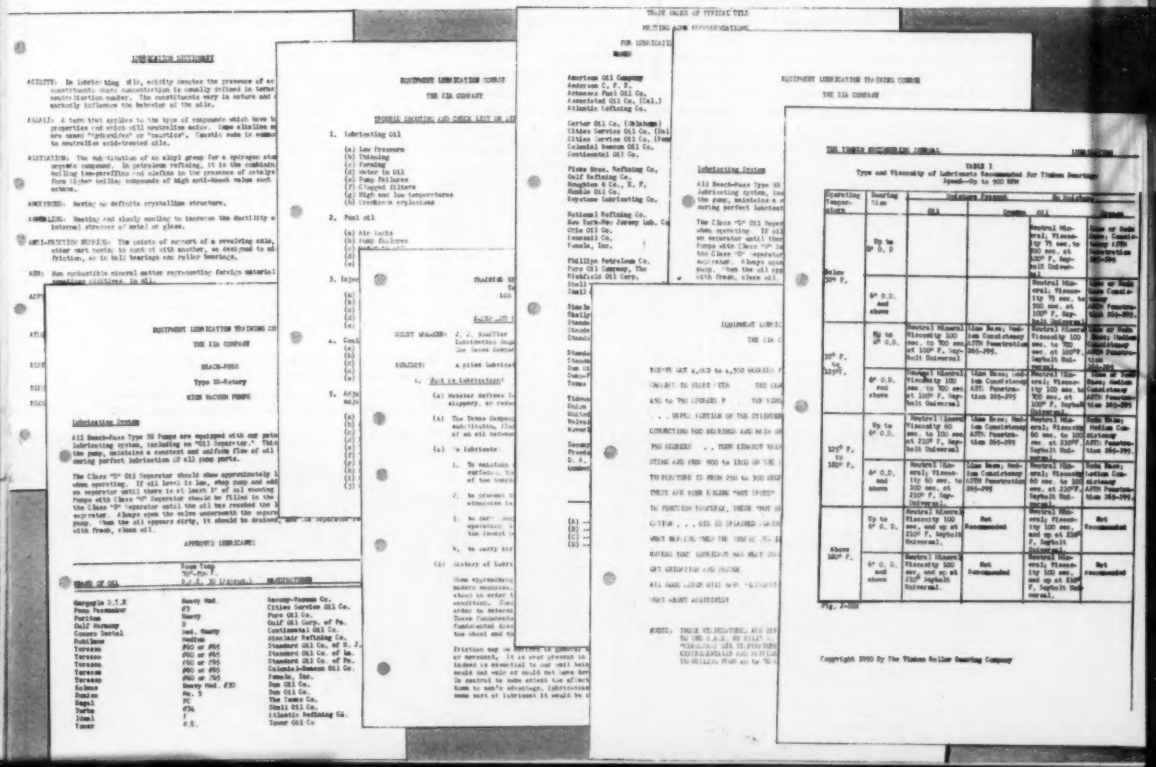
A central reference file on the subject of lubrication is maintained and always available as a means of keeping up with recent developments. In addition, each mechanic receives individual copies for his personal study and use.

Time is an important factor in measuring the results of this phase of training and since this particular course was completed just recently the full value cannot be outlined. However, the approach to lubrication problems, methods of testing and the ability to think out possible solutions has considerably strengthened lubrication practices. Recently, a heat circulating unit presented a serious problem due to the type of bearings used and the inclosure in which it operated. After careful study by the lubrication mechanics it was determined that the temperature in the unit was so high that bearings would not hold ordinary lubricants which had been specified for the equipment. By mixing a high viscosity oil with additives, a lubricant was developed which has proved highly satisfactory and passed severe tests.

Another example is a machine located in an explosive area. The gears required a heavy crater type lubricant which had to be heated before being applied. The restriction on fire in this area presented a problem but through their combined efforts, the lubrication mechanics developed a lubricant containing solvents which could be applied with a brush. After being applied, the solvent evaporated, leaving the lubricant on the gears to insure efficient operation and longer wear.

Management and organized labor of The Zia Company have cooperated to the fullest extent in making realistic training available to employees. Certificates of completion are awarded for all courses and presented at meetings attended by representatives of management and labor, students, and guests. Operating supervisors cooperate to the fullest extent in making equipment, mockups and facilities available and energetically follow up any requests of employees for advanced training. The enrollment and attendance indicates a desire for self-improvement by skilled men who will be ready for any load that the future may demand.

Samples of some of the training aids which are used in lubrication training course. Similar aids are used in other courses



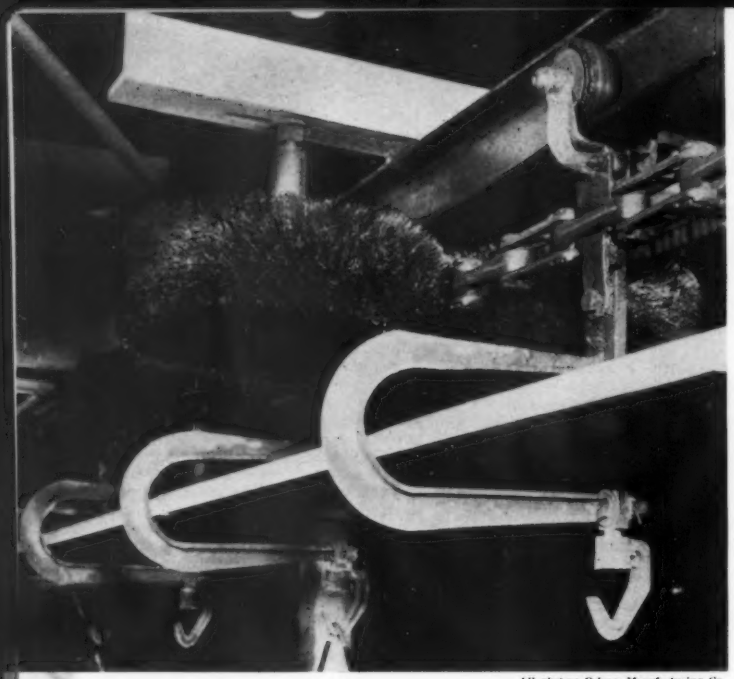


Fig. 1. Substantial savings in cost of conveyor chain maintenance have been obtained by this brushing installation

All photos: Osborn Manufacturing Co.

Many jobs, which cannot be done economically by other methods, are being performed with applications of power-driven brushes . . . Examples shown here are but a few: cleaning conveyor chains, cleaning valve tappet holes and cylinder bores, brushing cylindrical parts with minimum handling

By RICHARD R. SCHULZ,
Osborn Manufacturing Co.

POWER BRUSHES—
Clean Up on the Production Line

PERHAPS NO OTHER single factor in industry is as important as maintaining machinery and equipment, and keeping the production line moving. Production equipment down-time is without a doubt the most expensive loss a production line can suffer. Everything stops when the machines stop.

Power brushes, used as maintenance and production tools, are aiding greatly in minimizing down-time. Not only do they save on maintenance costs, but they provide substantial savings in operating costs.

An excellent example of this point is a unique power brushing technique that is being used in many high-rate-of-production plants throughout the country.

One such installation is the brushing set-up which, operating in conjunction with the plant's conveyor assembly, is designed to eliminate the problem of scale deposits on the conveyor chain, which passes through a rust-proofing solution at one stage of the assembly process.

Two circular wire brush sections 15 in. in diameter are mounted on each side of the conveyor chain as shown by Fig. 1, to contact it just after the chain emerges from the bonderizing bath. Not only does it clean off the scale deposits, but also excess grease, oil and dirt which accumulates in regular service.

Prior to the introduction of the brushing method of de-scaling the chain, it was necessary to halt production periodically, remove the conveyor chain, and clean it in a caustic solution. No special power mechanism is required to operate the brushes. They revolve with the chain, cleaning it continuously as the production line moves.

The installation was especially designed to meet a specific need and it may provide the solution to numerous other conveyor chain problems which cause production bottlenecks because of accumulations of excess

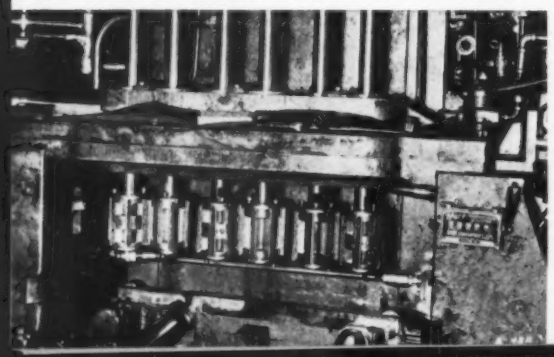


Fig. 2. Shown in operating position, with the motor block removed, are the brushes used to clean excess lubrite from cylinder bores. After the cylinder block is moved into position brushing requires less than a minute to complete

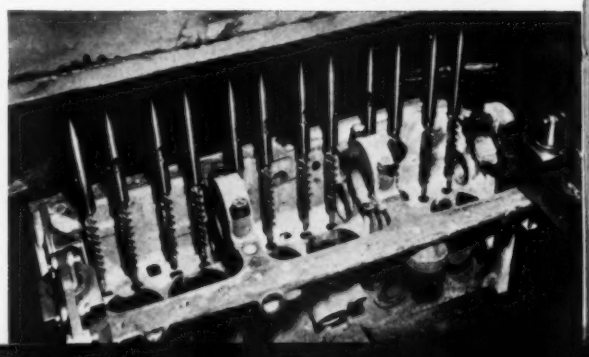


Fig. 3. Mounted on a 12-head spindle turret-type drilling machine these brushes have reduced re-runs 75 per cent. Rotating at 800 rpm, the setup completes the cleaning operation in 30 sec. Brushes are of 0.007 crimped steel wire

grease, dirt, paint and other foreign matter. It no longer becomes necessary to stop the production line to clean the chain.

Power brushes, used as production tools, have virtually eliminated down-time of a machine used to remove excess lubrite from valve tappet holes and cylinder bores. This was formerly done by another method, and the machine would have to be stopped to be cleaned.

The strip brushes, see Fig. 2, being used in the cylinder bores are 4-⅛ in. long and 13/16 in. high. They are made of crimped steel wire mounted six to a set on the heads of a multiple head vertical boring mill.

The motor block is indexed into position and the brushes lowered into the bores. Spring tension plus centrifugal force throws the brush face against the inside diameter of the bore. The head oscillates up and down approximately eight times and is withdrawn. This operation is completed in less than one minute, with the brushes rotating at 75 rpm

Brushes used to clean the valve tappet holes, see Fig. 3, are made of .007 crimped steel wire. They are 6 in. long, with 1 in. outside diameter, mounted on a 12-spindle turret type drilling machine. The cleaning is done automatically for approximately 30 sec. The brush rotates at 800 rpm.

"Centerless brushing," developed by the research staff of a leading brush manufacturer, has provided the solution to the important problem of getting the work piece into and out of the machine in the shortest time with minimum handling, and yet obtaining high finish on round surfaces, thus saving many valuable production hours.

By using a 20-in. diameter brush on a centerless grinder, one manufacturer of pistons is saving considerable time on assembly. The 3 in. diameter pistons now assemble easily with increased precision. In addition, centerless brushing has prolonged the smooth working life of this part.

The residue and sharpness of grinding formerly acted as an abrasive when the compressor assembly was started. Centerless brushing now not only removes the grinding residue, but also blends the sharpness of the surface.

The brush being used has a 6-in. face and is made from .005 diameter crimped wire. The pistons are now machined, ground and then centerless brushed for finish. The work is gravity fed from a magazine type chute, as shown by Fig. 4. A small driving wheel, set at an angle, rotates the parts and drives them through the brush area. The brush rotates at 1200 rpm.

One of the most recent applications of power brushes used to increase production in the factory is solving the problem of cleaning dirty windows. This is a perfect example of the flexibility of a power brush.

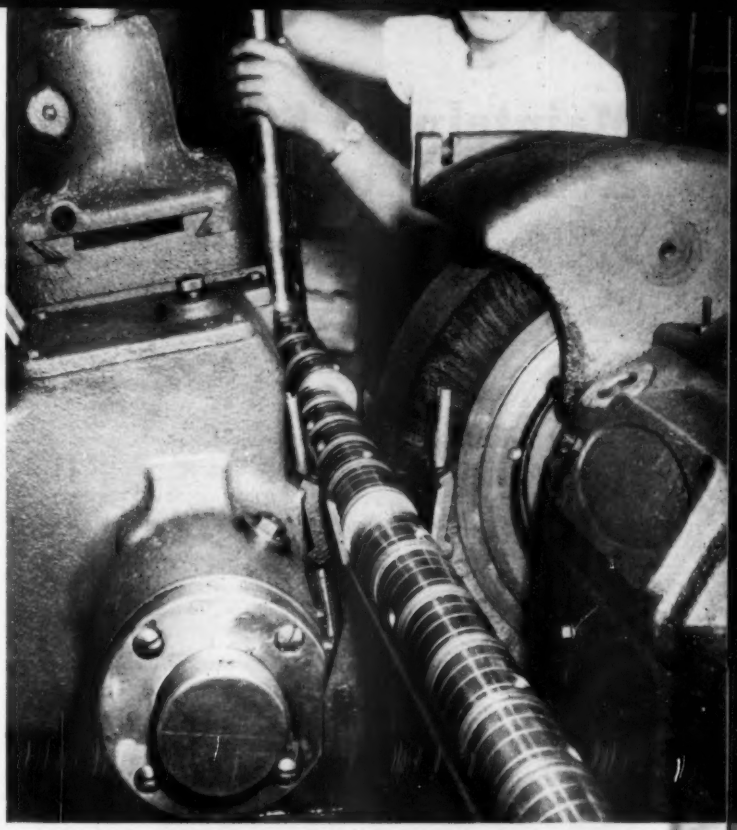


Fig. 4. A brush with a 6 in. face puts a high finish on the rounded surfaces of pistons. This technique, developed by the technical department of the author's company, aids in assembly and saves many hours. The brush rotates at 1200 rpm

Fig. 5. Wire brushes, used to clean grime from factory windows, illustrate the extreme flexibility of this production toil. Wire brushes are mounted on portable tools, operate at 3,450 rpm, and do job that cannot be done with soap or water

Maintaining Steam Quality At Sohio Refinery No. 1

Steam quality is important in refinery operations due to high processing temperatures and the potential hazards of "stray" water slugs in the lines . . . Excessive condensation caused by extreme lengths of steam lines and attendant heat loss settles in the low points of lines to form water slugs . . . Steam separation equipment on important mains and turbines will remove excessive moisture to return steam to its original quality, affording practical, low-cost protection for valuable equipment

By C. D. CRAWFORD, Utilities Superintendent
No. 1 Refinery, Standard Oil of Ohio

SOHIO'S NO. 1 REFINERY in Cleveland was troubled by a high percentage of moisture in the high-pressure steam lines. This excessive condensation was caused by heat losses in the No. 1 Loop and auxiliary mains, due to their excessive length. The latter carry steam at 150 psi for some 2,500 ft to prime movers and processing equipment in a remote section of the refinery. Here the company operates four thermal cracking units, two catalytic cracking units, a catalytic polymerization unit, gas recovery and stabilization equipment, and a cooling tower.

Steam demand for this equipment amounts to 4,000,000 lb at 150 psi each 24 hr. Three lines from the main loop are employed to serve the processing equipment. A 14 in. line carries approximately 81,000 lb per hour; a 12 in. line is used to carry 84,000 lb per hour; while the third, an 8 in. line, carries 32,700 lb per hour.

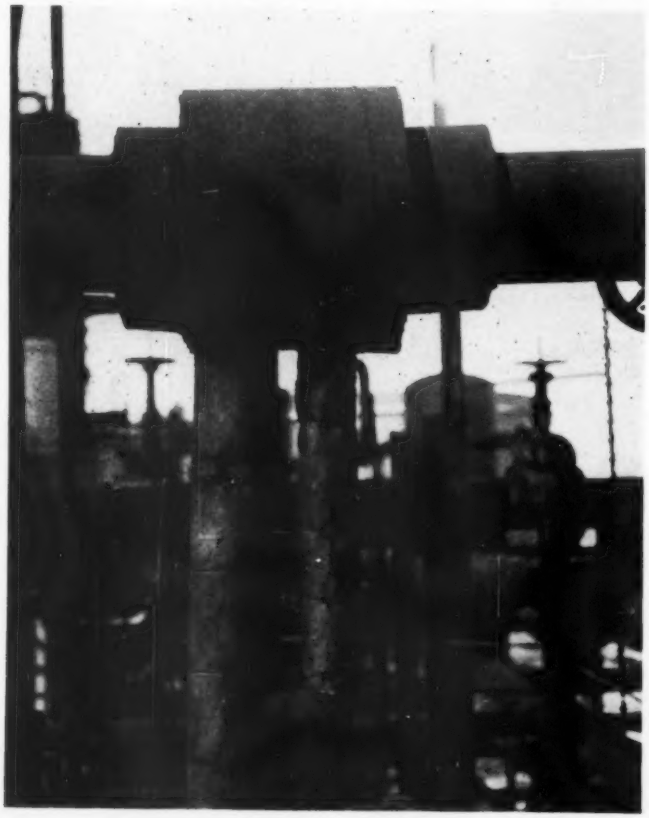


Fig. 1. Line purifier used for slug removal on the 6 in. steam line at the cracking coil charge pump turbine

Tests on steam leaving the boilers revealed less than one per cent moisture carryover at this point. A similar test was conducted at a point at which the mains ascend a hill to reach the remotely located section. This spot is approximately 2,000 ft from the No. 1 loop and some 500 ft from the processing area. The test here on the 14 in. line revealed a moisture content of about three per cent, indicating that condensate was tripling in some 2,000 ft of travel from the boilers.

Area Control of Quality

The need for clean, dry steam for the processing equipment in this area led Sohio's refinery men to seek a means of drying the steam in the mains before it reached the branch lines throughout the area. If steam quality could be improved at the point where the second test was made, the need for duplication of protective equipment on branch lines and individual pieces of equipment would be reduced.

Accordingly, the company installed line-type Centrifix steam purifiers on the 14 in. and 8 in. mains. These consist of flanged, forged steel bodies containing multi-bladed steam directioning tuyeres at the inlet. Moisture and entrainment are separated by controlled centrifugal forces created by the special tuyere design which directs incoming steam into a whirling mass. Heavy moisture and entrained particles are cast out of the whirling

steam and against the purifier walls. Condensate is removed through a drain, while the dry steam passes through the outlet of purifier and on into the line.

Since the purifiers were installed on the 14 in. and 8 in. lines, indications are that moisture is reduced to such an extent that the steam is returned to approximately its original 99.9 per cent quality. The company feels that this has enabled it to successfully control steam quality before the steam reaches the branch lines.

Used as Slug Arrestors

The problem of steam quality also has been encountered in other parts of the refinery with equipment operating off the main loop. Five turbines in this section of the refinery are used to power various pumps. Here again, moisture accumulations in the loop and branch lines collect to form occasional slugs which slow down the units and tax the shock load limits of turbine blades.

The original knock-out drums, located in the branches before the turbines, were discarded by the refinery men due to inefficiency and inability to meet the stringent ASME Code for unfired pressure vessels. In place of the knock-out drums, the company adopted the line-type steam purifiers to maintain steam quality while serving as slug arrestors up to the capacity of the auxiliary trap equipment used.

Purifiers have been placed in 6 in. branch lines which power two 600 hp turbines that drive the cracking coil charge pumps. These units purify about 7,000 lb of steam per hour to approximately 99.9 per cent quality while affording a safeguard against the occasional slug up to the capacity of the trap. Two more purifiers have been installed on 4 in. lines feeding the 150 hp crude still charge pump turbines.

Slugs entering the purifiers are directed into a whirling motion which throws the water against the walls of the purifier chamber. The slug drops to the bottom where it is evacuated through the drain to the trap. In addition to diverting slugs, the purifiers, of course, provide continuous entrainment removal, increasing steam quality to over 99.9 per cent. This factor has enabled the exhaust steam from turbines to be used for processing work.

A further application for the line purifiers as slug-arresting equipment is found in the refinery on stand-by equipment. Turbines that see only occasional use are equipped with the units to remove the excessive amount of condensate that can collect and lie in "cold" lines.

Sohio's No. 1 Refinery Utilities Department is responsible for the uninterrupted steam delivery essential for continuous operation of all refinery equipment. This department is also responsible for steam quality, not only to protect purity, but to safeguard equipment against slug damage, and to protect personnel against the potential hazards of blow-offs caused when raw water hits crude oil at 660 deg temperatures. This responsibility has made the department extremely conscious of steam quality, and protective equipment has been installed to maintain quality and uninterrupted delivery.

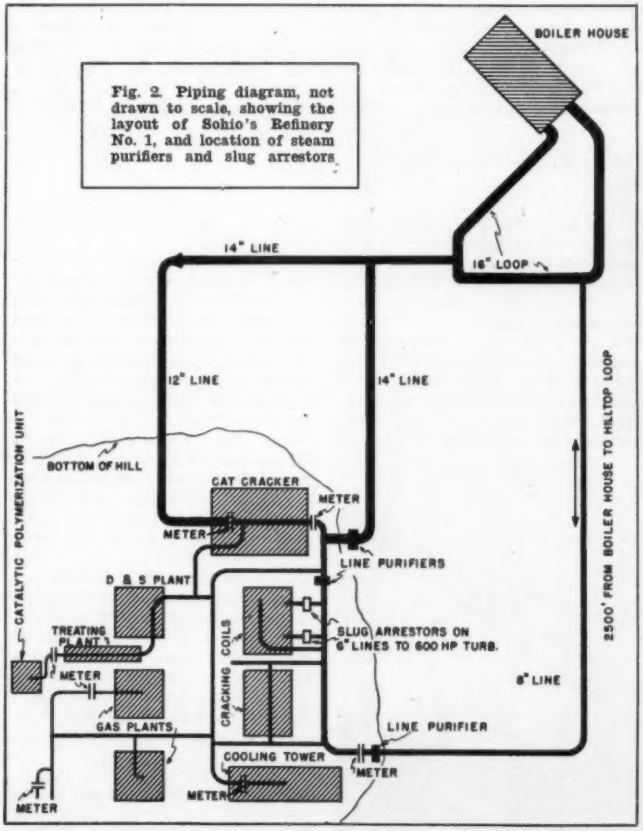


Fig. 2. Piping diagram, not drawn to scale, showing the layout of Sohio's Refinery No. 1, and location of steam purifiers and slug arrestors.

Now, They're Saving the Holes

YOU'VE HEARD OF the thrifty meat packer who claimed to save everything but the squeal? Well, Coleman Co. is going him one better—they're trying to save the holes left after parts have been cut from a piece of metal.

Well, maybe not to that extent, but they are doing an extensive job of salvaging scrap material. A record is kept of all scrap material, by dimensions. Each piece of scrap is studied to determine its possible use.

Ten burner sides for camp stoves are blanked from left over strip of steel

A good example of how this program works can be seen from the strip of steel left over after an oil heater casing end cap is cut out. It was found, on study, that this strip of steel could be used in cutting five left and five right bunsen burners for the camp stove.

A group of employees also work out ways to use substitute material. For example, a substantial saving has been realized on one of their air shutters. The part was originally made from cold rolled steel, and then zinc plated. It was found that they could use aluminized scrap to make the part and eliminate the zinc-plating process.

Fig. 1. A corner of the plant engineering department. The office of Robert Higman, plant engineer, is in corner

How the Plant Engineer Ties-In With Production at Boeing

A case study of Boeing's operating methods where the first manufacturing bite on a new contract is a ways-and-means conference of department heads, including plant engineering and transportation, to map strategy . . . Over-all company operation . . . Reasons for placing Plant engineering and transportation under a single head . . . Department organization and duties involving three plants, six warehouses and two airfields . . . Design and supervision of contract work . . . Maintenance procedures . . . Typical projects . . . Expense budgeting

By ROGER P. HOLMAN, Ass't to the V. P., Manufacturing
Boeing Airplane Co., Seattle, Wash.

TO ACHIEVE THE closest coordination between manufacturing, plant engineering and transportation at Boeing Airplane Co., we have evolved what we believe is an unusual, and what we know is an effective, chain of command. The plant engineering and transportation department heads report to a single member of the staff of the manufacturing division vice president.

This close relationship results from a dependence on plant engineering and transportation in aircraft manufacture, a dependence which is more pointed than in any field of production. Every production project expansion or contraction, every change in manufacturing schedule, and each addition of new work must be preceded by much effort on the part of plant engineering in relocation of work space, creation of new space, and, design and purchase of new factory machines and facilities.

Transportation of parts and facilities is a big job even when most production projects have settled into a routine of work at a set schedule, but the department must be prepared for even greater effort during periods of production changes.

Under the Boeing organizational setup which links these two departments under the manufacturing division, all major planning by the division's six staff members can be conveyed immediately to plant engineering and transportation heads and necessary work can be begun without loss of time.

To best illustrate how these two departments fit into the manufacturing organization, suppose that Boeing received a re-order for 20 commercial Strato-cruisers today, and is in a position to go into full-scale production without the restrictions of the present national emergency. The first manufacturing step

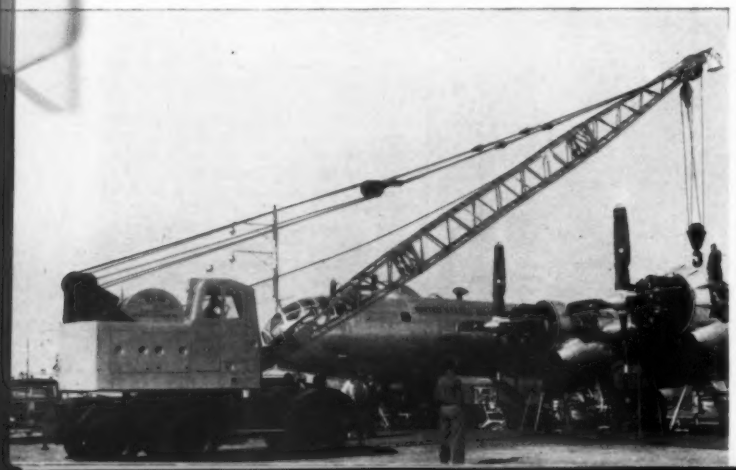


Fig. 2. Many special purpose vehicles are needed to meet the varied transportation, maintenance and manufacturing needs of this huge operation

would be a conference called by Fred P. Laudan, Boeing vice president in charge of manufacturing. In this meeting he would outline pertinent contract terms to his staff chiefs and discuss with them plans for getting work under way, establishment of schedules.

It is the head start that the plant engineering and transportation departments get by being represented at this meeting equally with the factory service manager, experimental manager, quality manager, factory superintendent and the adminstrative assistant to the manufacturing vice president that enables them to begin their planning early and coordinate their efforts with the other departments.

If new machines are to be required for the job, plant engineering must supply their specifications. It must determine in what areas the new work could best be performed and then make the necessary arrangements to make this space available. If this space already is in use, plant engineering must move its occupants and their equipment via the transportation department to another work area. If the plant space available is unsuitable or if all existing space is in use, plant engineering may be called on physically to reconvert warehouse space to factory space or to build a new building.

Once the space has been made available and work begun in it by production shops, plant engineering also falls heir to its maintenance. If a light bulb burns out or if installation of new machinery requires entirely new wiring, the change is made by plant engineering.

Similarly in any new work or expansion of existing manufacturing jobs the transportation department is among the first affected. Its job starts with moving the first facilities into the production areas. Then it successively moves raw material from railroad sidings to the fabrication area, transports all completed parts through assembly stages, and completes the job by towing finished airplanes from the factory to the nearby airfield.

Simplicity in staff organization and establishing a direct line of responsibility downward in the various departments, is of utmost importance. Examine for a moment several of the problems inherent in airplane manufacture. In one B-29 Superfortress there are 55,000 parts exclusive of some 600,0000 rivets. There is nearly 10 miles of wiring, 2 miles of tubing and 152 electric motors of 49 different types. Constant changes are incorporated not only in successive models of each airplane, but on virtually each individual airplane, as it passes through the production stage.

When one considers that this manufacturing is done in three

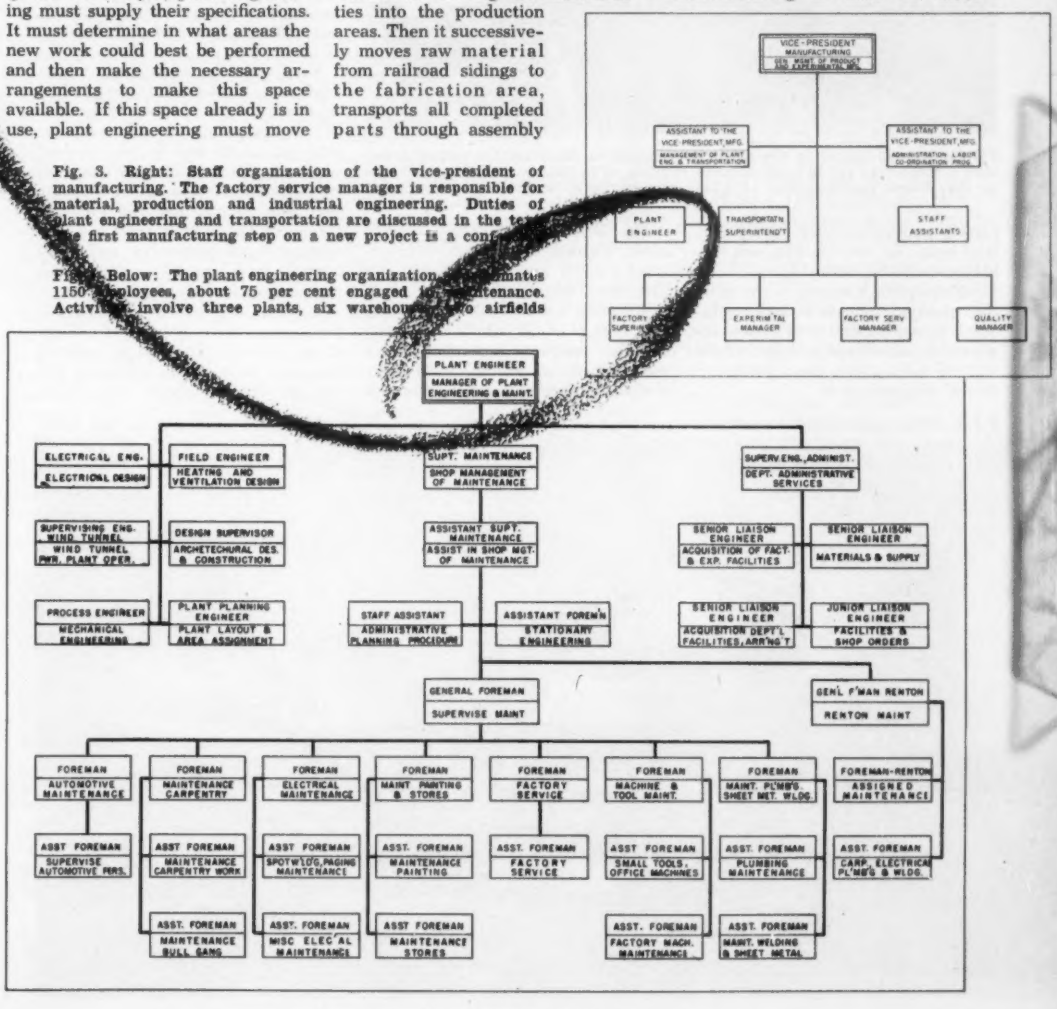


Fig. 3. Right: Staff organization of the vice-president of manufacturing. The factory service manager is responsible for material, production and industrial engineering. Duties of plant engineering and transportation are discussed in the text. The first manufacturing step on a new project is a conference.

Fig. Below: The plant engineering organization [illegible] maintains 1150 employees, about 75 per cent engaged in maintenance. Activities involve three plants, six warehouses, two airfields

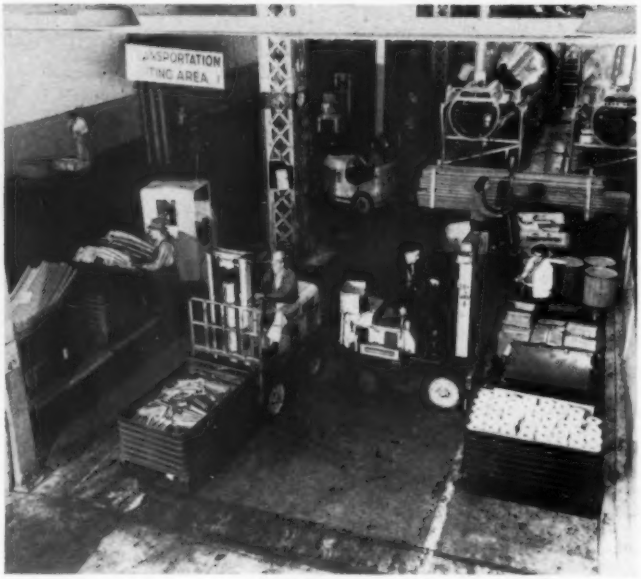


Fig. 5. A busy corner in one of the transportation department's sorting areas, with a few of the 440 in-plant vehicles. Upkeep of in-plant and highway vehicles is the direct responsibility of plant engineering's maintenance department

plants, comprising over 5,000,000 sq ft of area, six warehouses, and two major airfields, some of which are 15 miles apart, it is easy to visualize that problems of parts and equipment transportation and space reallocation are almost as labyrinthine in their nature as is the constitution of the airplane itself.

The Plant Engineering Department, headed by Robert Higman, breaks down into two groups: (1) The Plant Engineering Department, responsible for layout, specification and design of all plants, including outside contract supervision and procurement of all equipment including design and construction of all special items required for the manufacturing departments; heating, ventilation and air-conditioning; utilities and power plant operation and wind tunnel operation other than aerodynamic testing and (2) the Maintenance Department, which is charged with housekeeping, mechanical maintenance, and repairs of all equipment, including transportation vehicles, building and all alterations, all construction work except major building projects, and all utilities such as electric power, water, steam, compressed air, gas and sewage.

With all of the manufacturing operations divided between three Seattle-area factories, the responsibility for maintenance is separated up to the general foreman's bracket and brought together through the assistant maintenance superintendent's office for complete coordination of all activities.

Responsibility in Boeing's transportation department branches downward from the superintendent of transportation to an assistant superintendent and to two general foremen. Work is divided into four transportation areas under the supervision of foremen and assistant foremen. These four areas are: 1, fabrication, subassembly and tooling; 2, final assembly, warehouses at the principal Seattle plant, outside yards and overhead cranes; 3, pre-flight and operational flight areas, outside warehouses and all transport activities at a nearby but smaller Seattle plant; and 4, all

Fig. 6. Of the nearly 190,000 truckloads transported by Boeing in 1950, many consisted of heavy hauls like the one below

activities at the government-owned, Boeing-operated assembly plant at Renton, Washington, 8 miles away.

During 1950 this department's outside vehicles travelled 1,300,416 miles, carried 510,727 passengers, transported 189,822 truck loads and incidentally paid $9,564.25 in Washington license fees. Roughly 80 employees drive these vehicles and had no major accidents. All accidents are evaluated by a board of three; a man from maintenance; a transportation supervisor; and a driver who was not involved in the accident. This board examines the evidence and decides if the driver was at fault. If he was not, his record is not affected.

Much of the haulage consists of wing and fuselage sections and Boeing has had guy wires removed and obstructions raised to 20 ft clearance along the highway for the entire 8.5 miles between Renton and Seattle. Many of the loads are overweight and require a special highway permit. Four of these permits at a cost of $25 per month each are kept in force at all times. Wide loads, over 12 ft, require in addition a pilot car bearing a large sign "Danger! Wide Load Ahead!"

Procedures and methods of work authorization used in the plant engineering and maintenance departments are designed to require the minimum of paper work consistent with good control and cost accounting. Expense projects of $100 or more, covering other than normal maintenance requirements, and projects of a capital asset nature are controlled basically by our facilities budget. This is prepared once every three months. Approval for the expense portion of this budget is obtained from the company comptroller. This capital portion is processed for approval by the Board of Directors.

Upon approval of the facilities budget, plant engineering proceeds with the preparation of detail designs for each project and processes job orders to the maintenance department for the majority of the work. In cases of major construction, however, involving heavy steel work, large paving jobs or new buildings, the work is contracted. In all cases the plant engineering department provides design, inspection supervision and liaison as required.

All minor repair work is the responsibility of and is accomplished by the maintenance department. Work as required is reported to the maintenance dispatcher by the supervisor of the area needing the service. The dispatcher then notifies a maintenance supervisor, who in turn assigns the work and schedules it in relation to his work load and its importance to the enterprise and the interest of the company. No paper work is involved in the transaction other than timekeeping after work is actually started. Time and material charges are made against the maintenance account of the department and account for which the work was done.

Neither does major repair work require paper work as far as authorization is concerned. It also is the responsibilty of the Maintenance Department. Such work, however, is always coordinated with the plant engineer for approval and technical advice. Further, if the expense involved will exceed normal overhead budget approvals, the plant engineer coordinates the requirement with the comptroller for additional funds before proceeding with the work.

Job Schedules

Typical run-of-mine examples of recent plant engineering projects. This department is directly involved in the expenditure of funds authorized by Boeing's Board of Directors. In 1950 these authorizations amounted to $7,500,000 for new tools, machines and plant expansion.

HEAT CONSERVATION program—During 1950 heating costs were reduced 25 per cent from the 1949 figure.[1]

MOVING JOB, $138,000 job, entailing switching the working areas of Boeing's production preflight facilities and modification shop at Boeing Field. Included in this figure was a $60,000 paving contract, supervised by the department, let to outside firm.

POLLUTION CONTROL, a difficult problem tackled and solved by plant engineering by: incinerators; diffusion basins; proposed neutralization of waste alkalines by excess acid waste from a neighboring foundry; a cyanide neutralization plant; and, for the most toxic wastes, sealing in steel drums and dumping in the ocean beyond the Continental Shelf[2].

OFFICE BUILDING, let contracts and supervised remodeling of 18,000 sq ft of office space in mid-town Seattle. Rented to provide an employment office in a centralized location.

EXCAVATIONS and FOUNDATIONS, for many large factory machines.

[1] See "Heat Conservation as the Plant Engineer Directs It," by R. J. Higman and Wm. B. Pride, page 30, December 1949 issue.

[2] A detailed story on this will be published soon—the author.

ROGER P. HOLMAN, a 23 yr Boeing veteran, started as a riveter's assistant to earn money for his last 2 years at the University of Washington. Successive promotions followed and he stuck to the job. Before his appointment as assistant to the vice president of manufacturing three years ago, other promotions were to: administrative assistant in the operations and production departments; assistant plant facilities manager; and, administrative assistant to the president.

Mr. Holman was born in Seattle, holds a private airplane pilot's license, and is an enthusiast of outboard motorboat racing, skiing and mountain climbing. In 1932 he won the Pacific Coast Class C outboard racing championship.

ROBERT J. HIGMAN, a mechanical engineering graduate of the University of Washington in 1938, joined the Boeing organization a year later as a draftsman in the Plant Engineering Department. Since that time he has been promoted to: lead engineer; assistant plant facilities engineer; plant facilities engineer; and, to his present position of plant engineer.

Mr. Higman, born in Kittitas, Wash., moved to Seattle with his family when he was 9 years old. Always a hard worker, he bundled shingles and set up a home workshop for putting metal edges on skis during grade and high school vacations and week ends. During University vacations he worked as a machinist in an Alaska cannery.

DAVID L. NURSE went with Boeing in 1939 as the only employee in what is now the Transportation Department "walking" blueprints and small tools from shop to shop. He grew up with the Transportation Department as its chief and now supervises 440 in-plant vehicles and 82 licensed vehicles. In 1950 the latter traveled 1,300,946 miles and carried 510,727 passengers.

Mr. Nurse in 1930, when 15 years old, won the Ohio State cross-country motorcycle championship. Later he rode the motorcycle from Columbus to Seattle, attended the University of Washington, played basketball, and served as ski instructor at the Seattle Times Ski School. During the summer months he captains a star-boat sailing team.

SHOP CONTROL CENTERS
Their Operation and Management

While the management of plant control centers does not always fall into the lap of the plant engineer, in the majority of cases it will pay him in liaison work, to be familiar with their operation . . . He should know good ones from bad ones, and why they are good or bad; he should know how their operation can affect production schedules . . . They are important factors to consider in employee relations, too

By A. M. ELLIOTT, Plant Engineer

IN A RECENT issue (PLANT ENGINEERING, June, page 70) we described the design, construction and equipping of shop control centers suitable for various clerical operations. The plant engineer should be more than just passingly familiar with the paperwork tasks performed in these centers.

If Production or Accounting simply comes down into the shop and says that they need desk space —chances are that's just what they'll get; unless the plant engineer is on his toes, as he usually is. The Accountant roaming around may be aware of the noise and the dust, but not know their effect on workers. Such facts should be within the ken of the plant engineer. Then he'll think of some way to combat them.

Taking a small layout, of the department or building floor to be served by this proposed clerical installation, the plant engineer might set up what may be called a "Personnel Load." This sort of chart should also be used in the locating of washrooms, drinking fountains, snack bars, or other personnel service centers. Roughly blocking-in operational units, turret lathes, drill presses, chipping crew, centering machine, cutters, filers, he would enter the number of persons located in the individual sections. Then choose the spot that is equidistant from them in number.

He might then familiarize himself with the clerical duties to be performed at the new location. Does the writing require a desk, as first suggested? Perhaps not, certainly one smaller than the usual 60 by 30 in. will do. Filing in the drawers might be a hindrance rather than a help.

Has anyone suggested charts, or the 1, 2, 3 type of scheduling board? Here jobs are filed in order of "now being performed, next to be run, and subsequent jobs to follow." All this does not mean that the plant engineer should shoulder a load belonging elsewhere. He can, however, perform very effective liaison work.

He does, by knowing the shop as well as the operating heads and having an educational background similar to that of the office force, have a good idea of the requirements of each. Bringing them together for the maximum benefit of both and seeing that they function in the best way for the firm is the prime interest of all concerned.

It would be well to point out a further benefit that would accrue. In a good many plants, monthly requirements and, in many cases, customers' orders are passed from the sales department to the production section and thence to the shop as a list. Perhaps these are supposed to be run in the next 30 day period.

Sometimes, however, the indiscriminate running of work by the operators themselves in the absence of the foreman throws the schedule off completely. A man who is set up to run a lot on a drillpress and is making good money, is loathe to leave it.

Job Control Important

Without proper control, and not having been told not to run them, he'll go ahead. Who wouldn't? The foreman may not have known the last time he was by that the "tub" of new work would be moved up so soon. He may have told the workman he wanted such-and-such a job run next. Some workmen, nevertheless, have convenient memories and, when the orders are not in writing, they simply "forget."

Economy-wise it might appear that he has done the right thing—leaving the setup unchanged and getting on with the same type of work. This is not always so. The next operation to be performed, after drilling, may be an unusually long one. Having two "tubs" of work ahead means work-in-process cluttering up much needed floor-space elsewhere.

Worse yet, the job that should have been run, but was "forgotten" may mean a starved machine at the next operation. To this problem of bad machine-loading may be added the one of collusion between group-leaders, foreman and operators. In the case where departments are paid bonuses on a tonnage or piecework basis, over and above the earning per piece of the machine operators, money-making jobs get first crack.

"Smart-Apple" truckers (and there are a few) know of such things and can, without saying anything, see that the materials are so placed or shifted that heavy money runs are done first. All this is not possible if the actual production is centrally-controlled and the production worker needs a ticket for each job that he performs.

It is in the solution of a problem such as this that another advantage in our shop control centers becomes apparent. Since it is in the interests of Department 2 that the material flow in Department 1 be controlled, might not this interest be furthered if the control of Department 1 were performed in the booth of Department 2?

The distance that the workers would have to walk in checking out of their jobs, would be a disadvantage. Hence, inter-coms. In addition to the advantages to be gained production-wise is the definite cash-saving in clerical help. This used to be measured at an average figure of $2500 dollars a year. Taking the present day wage scale into consideration this may be revised upward to a conservative $3120.

Pursuing such a subject can, naturally, add to the plant engineer's interest in good personnel relations. Taking into consideration the comforts of the occupant of this center, he can come in contact with any number of subjects, perhaps for the first time. The matter of physical approach to the booth is one. If the standing worker is at the same height as the seated clerk, they're both better off. Using a furnace blower as an air-conditioning medium and a filter all add spice to the design and construction of the center.

Getting one person out of the dust and noise is bound to awaken an interest in bettering the physical comforts of other workers. The mere isolation of the structure from the floor by use of shock mounts could easily bring about isolation of the noise makers at the source by the same principle.

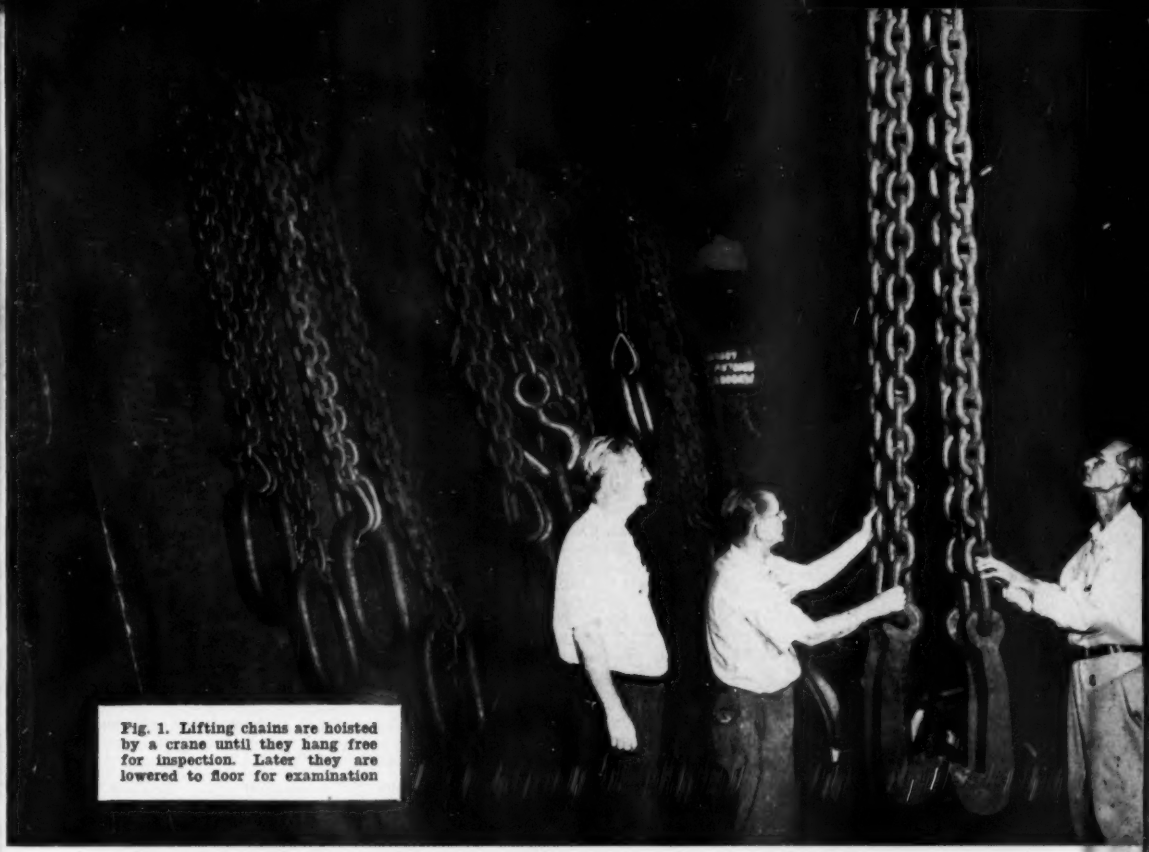


Fig. 1. Lifting chains are hoisted by a crane until they hang free for inspection. Later they are lowered to floor for examination

SLING CHAINS—

How They're Used and Tested at Westinghouse

A rigid safety program and change-over from wrought iron to alloy steel chains created problems that were solved as told here . . . Methods of testing and determination of safe loads . . . Reasons for chain damage and what to avoid

By HARRY H. BATES, Works Engineer
South Philadelphia Works, Westinghouse Electric Corp.

SOME 1200 wrought-iron lifting chains of sizes varying from ⅜ in. to 2½ in. are being replaced by alloy-steel chains in the Westinghouse steam-turbine manufacturing plant at South Philadelphia. It is impractical to scrap all the wrought-iron chains at once since the cost of the complete change would be about $250,000 and there is still considerable life left in many of the wrought-iron chains. A program has been adopted of replacing wrought-iron chains with steel as fast as major repairs are needed in the older chains. It is calculated that about 125 chains will be replaced each year.

There are good reasons for the change. Alloy steel chains are two to two and one-half times stronger for the same link size. They are harder and less susceptible to cuts or other abrasions. They are better designed as they are flash welded by machine and the links are so shaped as not to lend themselves to kinking. They are heat treated to a given hardness and do not require annealing, *in fact they must not be annealed*. The main objection to the use of alloy steel chains is that, lacking the ductility of wrought iron, they give less visual indication of overstressing before breaking.

The plant where the change is being made is one of the very heavy industries where chain loads vary from a few pounds to occasional loads of 120 to 135 tons, with a great many lifts of 20 to 50 tons. All local overhead cranes have double hoists. The large hoists are for the maximum rating of the cranes and are of slow lifting speed. The smaller hoists are suitable for about one-tenth of the maximum rating and have high lifting speeds.

It is customary to carry ½-in. chain on the hook of the smaller hoists. Most of these chains have two legs and hooks. Single-leg, three-leg, and four-leg chains are available, but each is considered re-

served for special applications and normally is not carried on the hoist.

When the first alloy-steel chains appeared in the plant they became mixed with the wrought-iron chains so that only the skilled inspectors could be depended upon to know which was which. There cannot be two sets of loading specifications for chains of the same size for it would be inevitable that a wrought-iron chain would be used at times under the assumption that it was made of the stronger material.

It was decided that no chain would be loaded to more than the safe load on a wrought-iron chain during the time of the change to avoid the chance of certain damage to parts or equipment, or worse, the possible cause of injury to workmen. The same maximum loading was marked on the steel chains as for wrought iron. This provides a very large factor of safety for the steel chains and, for the time being at least, does not utilize their maximum safe capacites. A particularly bad break in a chain link is shown in Fig. 2.

Another condition that was not anticipated immediately, but that was discovered in time to avoid changing the chains, was the size of the hooks. Bull-rings and hooks must be stronger than the chains themselves. No failure gives so little indication of overstressing as failure of a bull-ring or hook. Even though these parts are made of the same material as are the links, the hooks, owing to their shapes, must be made in sturdier sizes than in the case of wrought iron.

When the proper hook sizes were determined, it was found that they would not go into the standard eye bolts and lifting holes in equipment of current design. If the full strength of the material could have been utilized, it would have been a simple matter to use the next smaller size of chain, but during the transition this was impossible. Various devices are used to adapt to the larger hooks but the final solution will have to be a change from the present eye-bolts to new standards. This will be no small item of expense.

Causes of Chain Damage

The principal causes of chain damage are due first, to overloading by either underestimating the load being handled or by hooking-on to a part with a two- three- or four-leg chain with a wide spread between the hooks. A booklet is in the possession of every man who has anything to do with cranes, and a chart is found at every chain rack, giving the permissible loads with different angles the chain makes with the horizontal when loaded. Tables I, II, and III are taken from this booklet.

The second greatest reason for chain damage is the cutting of the chain metal itself. A primary cause of cutting is the wrapping of a chain over a sharp edge of a part being lifted. Instruction books distinctly demand that wood blocking be used to cushion the chain and prevent it from actually touching the sharp edges. Another cause of cut or indented links is due to a whipping action of a casting or part being turned. When such a part is turned, too frequently the equilibrium of the part is disturbed, causing the lifting chain to take a heavy shock. These same conditions that cause cutting may cause bending of the links.

A third cause for cut chains is the practice of disengaging the hooks after lifting and then pulling the chain through holes in a part, or from beneath a part, with the crane

Table I. Safe loads for chain slings as posted at the South Philadelphia plant

	ANGLE CHAIN SLING IS USED AT			
DIA	STRAIGHT	60 DEG	45 DEG	30 DEG
3/8	1800	1550	1250	900
1/2	3000	2600	2100	1500
5/8	4600	4000	3250	2300
3/4	6750	5850	4800	3400
7/8	9350	8100	6600	4670
1	12400	10700	8750	6200
1 1/8	15600	13500	11000	7800
1 1/4	19200	16600	13600	9600
1 3/8	23000	19900	16300	11500
1 1/2	27200	23600	19200	13600
1 3/4	35000	30300	24700	17500
2	44400	38500	31400	22200
2 1/2	69600	60300	49200	34800

The safe loads specified in the table are for each single chain leg, and must not be exceeded. When used double, or in any other multiple, the load may be increased proportionately. If, for example, the sling has 3 legs, the load may be 3 times the load specified above. Stub hooks are to be used for lifting apparatus which is provided with holes for that purpose.

Table II. Wire rope sling safe load table included in book issued personnel

	ANGLE WIRE ROPE SLING IS USED AT			
DIA	STRAIGHT	60 DEG	45 DEG	30 DEG
3/8	2050	1750	1450	1000
1/2	3700	3200	2600	1850
5/8	5600	4850	3950	2800
3/4	8050	7000	5700	4000
7/8	10800	9350	7650	5400
1	14000	12100	9900	7000
1 1/8	17600	15200	12400	8800
1 1/4	22000	19000	15500	11000
1 3/8	27200	23600	19200	13600
1 1/2	32000	27700	22600	16000
1 3/4	43200	37400	30500	21600
2	52000	45000	36800	26000
2 1/2	85600	75100	60500	42800

The safe loads specified in the table are for each wire rope and must not be exceeded. When used double, or in any other multiple, the load may be increased proportionately. If, for example, the sling has 3 legs, the load may be 3 times the load specified above. Stub hooks are to be used for lifting apparatus which is provided with holes for that purpose.

Table III. Safe loads in pounds, for Manila rope, when used at various angles

	ANGLE MANILA ROPE IS USED AT			
DIA	STRAIGHT	60 DEG	45 DEG	30 DEG
3/8	200	170	140	100
1/2	340	290	240	170
5/8	560	480	400	280
3/4	690	600	490	350
7/8	980	850	690	490
1	1150	1000	810	580
1 1/8	1550	1350	1100	780
1 1/4	1750	1500	1250	880
1 3/4	2240	1950	1600	1100
1 1/2	2450	2100	1750	1200
1 3/4	3550	3100	2500	1800
2	4200	3650	2950	2100
2 1/2	6100	5300	4300	3050
3	8550	7400	6050	4300
4	13600	11800	9650	6800

The safe loads specified in the table are for each single chain, wire or fibrous rope, and must not be exceeded. When used double, or in any other multiple, the load may be increased proportionately. If, for example, the sling has 3 legs, the load may be 3 times the load specified above. Stub hooks are to be used for lifting apparatus which is provided with holes for that purpose.

hoist without careful feeding of the chain by hand so as to avoid scraping the links.

Twists in chain legs may be caused by bent links. More often, twisted links are caused by a chain being stressed with a kinked link, which may more properly be described by saying that the long axis of a link is not in line with the long axes of adjacent links when lifting. Usually the kinked link will correct its own position when stressed, throwing an instantaneous shock on that leg of a chain. Sometimes it does not become properly positioned, which throws the link under stresses for which it was not designed.

Each of the above becomes the responsibility of the chain inspector to detect. The means of inspection is relatively simple, but real knowledge of chains and the conditions to be looked for requires experience. The chain is lifted by a crane until its full length dangles freely as shown in Fig. 1. With multiple-leg chains the inspector sees that all hooks hang to the same elevation. Single-leg chains must measure the same as the length stencilled on the marking ring. The latter is a small ring bent around the bull ring on which are stencilled the serial number of the chain and its length.

On older chains the stencilling was indented on the bull ring and sometimes the maximum loading of the chain was also so stencilled. This practice was discontinued because the metal fibers of the indented chain might be cut, and the "maximum loading" was discontinued as a single-leg of a multiple-leg chain may be used alone. In that case the marking would be incorrect as the maximum loading would be one divided by the number of legs and multiplied by the "maximum load" as stencilled. If a multiple-leg chain is old, it is measured to indicate amount of wear.

Visual Inspection Important

A glance upward by the inspector instantly tells him if the links line up. If they are out of line, there must be a bent or twisted link. He measures the opening of the hooks to determine whether the hooks have been strained.

The next operation in chain inspection is to lower the chain slowly to the floor to examine for cracks, cuts, or other abrasions.

If found defective in any way, the chain is condemned by the inspector and a red tag is placed on it indicating that it is not to be used. This tag is perforated, and the reason for condemnation is written in on the bottom half that is torn off and sent to the Works Engineering Office where the information is transcribed to a record sheet on the particular chain in question. This record is carefully kept, and is not only a check on the work of the inspector, but is most valuable in checking on the care of the shop personnel in the use of chains.

The active wrought-iron chains are annealed at 1300 F at three-month intervals. All others are annealed at six-month or yearly intervals. Wrought-iron work hardens readily, hence frequent annealing is necessary to maintain ductility and to avoid brittleness. A chain that broke due to brittleness is shown by Fig. 3.

When a wrought-iron chain is repaired it is done by hand welding, and after each repair it must be reannealed and tested to 200 per cent its rated load.

It is inevitable that chains will be overloaded or improperly applied as shown by Fig. 4. This has been a problem from the time chains were first used. As hookers-on find that the alloy-steel chains will carry heavier loads, the maximum loads that will be handled, particularly with the smaller sizes of, chain will increase. The responsibility and attentiveness of supervision increases until the complete transition from one material specification to the other is made. It is believed that the biggest problem in the transition will be on the human side. The revised stamping of chains and the larger hooks present definite problems, but they are problems that are predictable and can be coped with.

Fig. 2. A particularly bad break in a chain link was caused by overstressing. Safe load varies with chain material

Fig. 3. Coarse grain structure, caused by work hardening, could have been avoided by annealing chain frequently

Fig. 4. Deformation caused by overloading. Battering and scraping were caused by contact with sharp surfaces

NEW PRODUCTS summarized for your convenience

SPEED REDUCERS

Double-reduction type, are available in ratings from 1 to 100 hp

Speed reducers of the new Type DB are designed for applications on small- to medium-size drives where the prime mover is coupled or belted to the gear unit. They are all-external type helical gearing, arranged in a horizontal plane. When coupled to an electric motor, a straight-line drive results. Eight unit sizes are available; 12 standard gear ratios range from 6.25 to 58.3:1.

Other features announced include accurately-hobbed single-helical gearing, taper hardened; split construction cast iron case; splash lubrication system and antifriction bearings. Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

THERMOMETER

Features case of heavy corrosion-resistant stainless sheet steel

The TAG Model 8689 is offered for use wherever an accurate, dependable thermometer is needed regardless of weather conditions. The case is welded throughout and manufacturer says it won't break, bend or warp under conditions of use for which it is designed. The scale can be obtained in types ranging from -40 F to 400 F. A special feature is the removable scale and tube unit for easy replacement in case of tube breakage. Tagliabue Instruments Div., Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

VOLTAGE REGULATORS

Single-phase, dry-type induction units in ratings of 9.6 to 24 kva

Newest addition to manufacturer's dry-type voltage regulators, these single-phase Inductrols are intended to widen field of application in which uniform voltage control can be obtained economically with small regulators. They are currently offered for single-phase circuits, 600 v and below up to 1000 amp.

With standard controls, these Inductrols can be used for secondary circuit regulation where lighting and power are supplied from the same lines in mills, factories and large buildings. They can also be used in laboratories for controlling voltage in calibrating and testing meters, instruments and instrument transformers; operating resistance and induction furnaces.

Basically the Inductrol consists of a shunt winding on the rotor and a series winding on the stator. Varying position of rotor with respect to stator causes a variation of voltage in the series winding that will raise or lower the output voltage gradually, as required by load changes. The Inductrol equipment is housed in an all-steel cabinet with "live" parts enclosed. Transformer and Allied Product Divs., General Electric Co., Schenectady 5, N. Y.

WELDING FITTINGS

And joint, for use with internally coated, corrosion resistant piping

Available in standard sizes and types of welding fittings and joints from ½ to 30 in. dia, these new units are expected to provide lower cost and construction advantages of welded piping in systems handling many types of corrosive solutions. Turbulence is said to be eliminated because fittings have internal diameters identical with pipes.

Fittings and piping systems are factory coated or lined with corrosion resistant coatings. Necessary alterations can readily be made at time of installation. According to manufacturer, a typical fitting has three parts, an internal sleeve and two external fittings. Joint fittings are welded to pipe ends and both are then coated with a corrosion resistant preparation. The sleeve is then inserted into the fittings which are then butted together and field welded. Coating destroyed by the welding is replaced by a cold setting compound (introduced internally through a threaded opening which is later sealed with a pipe plug). When completed, the pipe and fitting are perfectly flush and fully coated.

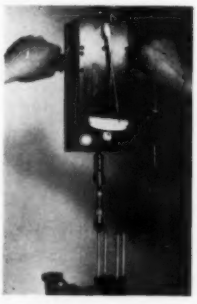
Standard fittings include concentric and eccentric reducers, 90 deg reducing elbows, lap joint stub ends, 45 deg elbows, straight and reducing outlet tees, return elbows, crosses. Wellstrom, Fifth St. and N. Ford Blvd., Hamilton, Ohio.

TORQUE-INDICATING DRIVER

Is new tool for driving studs to precise torque tolerances

The new Garvin Torque-Indicating Driver is designed to automatically measure the torque as it drives studs, nuts, screws or fasteners. Manufacturer says it eliminates stud breakage, reduces scrap loss, and eliminates need for hand-torquing inspections. This driver is built around a standard deflection-type torque wrench. In operation, minimum torque is indicated by the wrench and by a green light; maximum torque by the same wrench and by a red light.

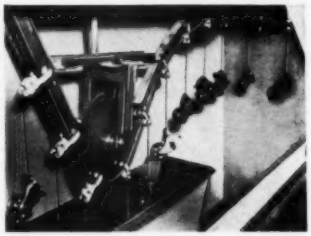
The unit can be furnished with a relay for interrupting power source and automatically stopping rotation when desired maximum torque is reached. The driver is made in six capacities from 0-100 to 0-2000 in.-lb. Electric, high-cycle or air motors can be specified. The smallest model is portable, others mounted on radial drill press type arms. Tru-Circle Products Co., P.O. Box 536, South Bend, Ind.



SHARP VERTICAL CURVE

For use with overhead trolley wheel conveyor installations

Developed for and largely used in dip painting of conveyor-carried production, the Quick Dip permits use of smaller dip tanks and saving of both paint and space. With a 10 by 18 in. part as an example, the Quick Dip requires a tank only 4½-ft long.



Company's Universal Cable Trolley Conveyor for which the Quick Dip is designed, is a lightweight conveyor for light and medium loads, and like the rest of this conveyor the Quick Dip is factory fabricated for plant assembly. Its radius of curve is 9½ in., included angle 60 deg. Dept. 35-B, The E. W. Buschman Co., Cincinnati 32, Ohio.

SUSPENSION ILLUMINATOR

For use where good light is needed required inside equipment

An overhead suspension light for underside illumination, the Anchorlite is suggested for lighting the inside of freight cars and trucks while at loading platforms, for use underneath equipment in repair shops, and for lower bin lighting. Since this light is mounted overhead it's always ready for use but out of the way; and it's grounded to its support.

The Anchorlite is designed to swing free on a swivel when suspended on a stationary bracket, or it may be suspended from a messenger wire to slide the length of a bay. The anchoring arm is pulled down and hooked under door or car opening. A slight downward pull unhooks it and, upon release, it automatically retracts to its overhead position. The Pyle National Co., 1334 N. Kostner Ave., Chicago 51, Ill.

STRAIGHT TUBE CLEANER

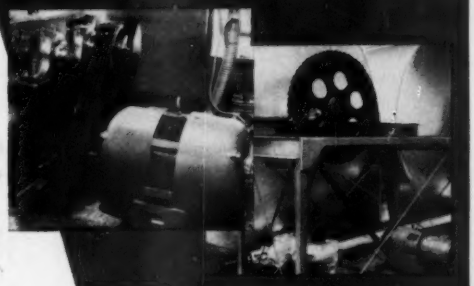
For refinery and process heat exchangers; is fast acting

The Model TP-301, an air-driven rotary shaft drill type tool, scavenges the tube with air or water while cleaning. It immediately removes deposits from completely plugged heat exchanger tubes, according to manufacturer, and because of its powerful action, does the job in fewer man-hours.

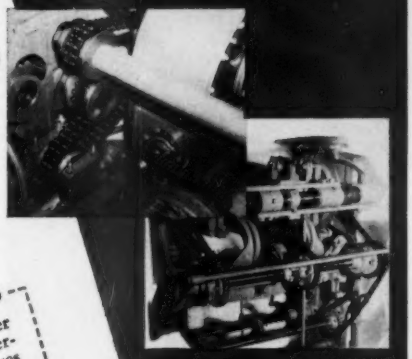
(Continued on page 102)

For All Essential Power Transfer Purposes

DIAMOND Roller Chains

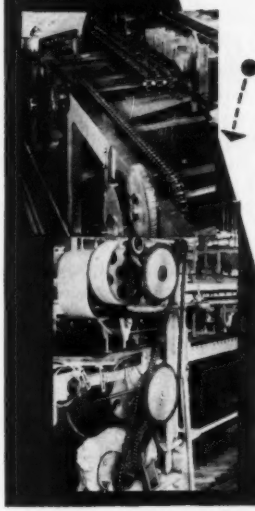


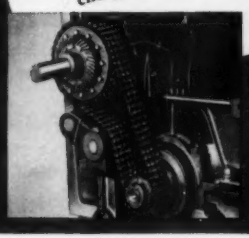
• MOTOR DRIVES
High Speed • Medium Speed
Low Speed • Short or Long Centers
Multiple Shaft Drives
Severe Service



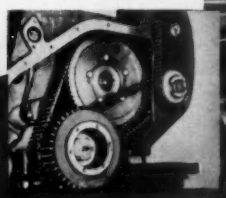
• MACHINERY APPLICATIONS
Main Drives • Intra-Shaft Drives
Multiple Shaft Drives
Transmissions

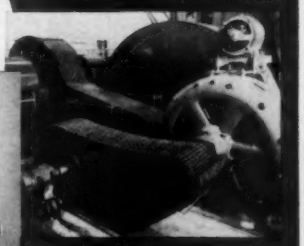
• CONVEYOR DRIVES
Standard Chains • Long or Extended Pitch Chains • Extended-Pin Chains • Straight and Bent Attachment Chains • Special Conveyor Chains





• ENGINE APPLICATIONS
Timing • Pump Drives • Power Take-off • Generator Drives • Supercharger Drives • Accessory Drives





• There is practically no limit to the adaptability of Diamond Roller Chains for power transfer purposes. . . . This, with the long-proven and established record for great reserve strength and uniform quality account for constantly increasing use of Diamond by experienced machinery and production engineers.

To maintain best production schedules—to improve the performance of machinery, you can rely on the Roller Chains with the Diamond trade mark.

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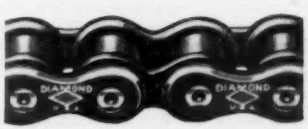
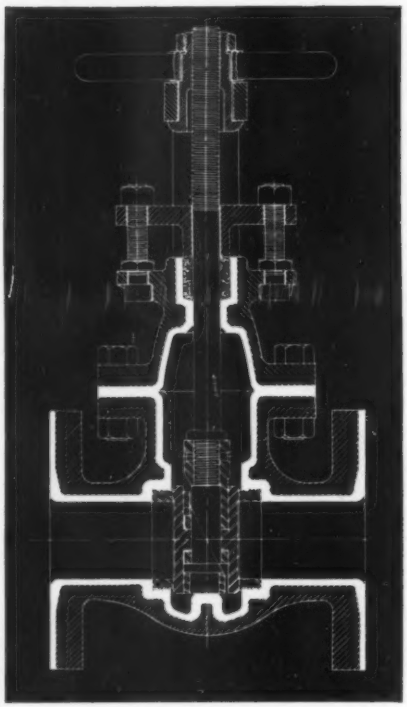
Dept. 614, 402 Kentucky Ave., Indianapolis 7, Indiana
Offices and Distributors in All Principal Cities
Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS



HANDLING CORROSIVE FLUIDS?

this unique hard rubber lined iron body gate valve offers big savings in many corrosive services . . .



Darling 150-pound rubber lined gate valve, with outside screw and yoke, featuring unique parallel seat, fully revolving disc principle. Plain "no pocket" discs prevent accumulation of sediment. Darling rubber lined gate valves can be furnished only in rising stem, cylinder or motor operated; or quick-opening types.

WHEN Darling gate valves of this type go to work, you gain *multiple* advantages sure to save you money *and* time.

First, you gain big initial savings because these rubber lined iron body gate valves (ideal for many corrosive services not exceeding 180° F.) are much less expensive than special alloy valves. Moreover, Darling's special bonding technique permanently prevents separation of the hard rubber lining from the valve body.

All interior working parts are made of alloys suitable for the corrosive conditions encountered.

Secondly, and equally attractive, is Darling's exclusive *fully revolving double disc, parallel seat* feature! In a nutshell this means drop-tight closure where most other valves would fail. It also assures unmatched life with a very minimum of attention and maintenance.

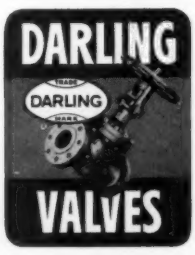
Here's a combination you just can't beat! Before you buy gate valves of *any* type, get acquainted with these unique Darling valves and their operating details. Get *all* the facts.

Write today for free bulletin describing Darling rubber lined gate and check valves.

DARLING VALVE & Manufacturing Co.
WILLIAMSPORT 14, PA.

DARLING VALVES FOR EVERY NEED

Darling parallel seat revolving disc gate valves are available in a wide range of sizes and constructions for all kinds of normal and unusual service, and for pressures up to 1500 pounds. In addition to rubber lined, iron body valves, corrosion resistant types include plain iron body with special alloy trim, cast steel, all bronze, special alloys or combinations as required. We'll gladly furnish specific recommendations on the proper valves for your particular service.



FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

USE LOTS OF HOT WATER AT UNBELIEVABLY LOW COST...

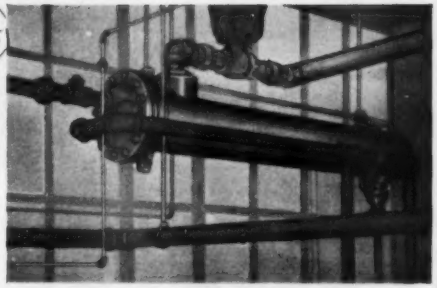
because Better Washrooms and Showers mean

HAPPIER–HEALTHIER EMPLOYEES–

LESS TURNOVER– LESS TIME OUT!

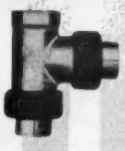
Don't spend a small fortune for all the clean, piping hot water your employees can use. A TACO field man will be glad to size up your problem for you. You won't have to buy a storage tank either.

MAY OUR FIELD ENGINEER GIVE YOU A DETAILED MONEY SAVING RECOMMENDATION?

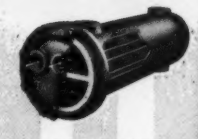


TYPICAL TACO INSTALLATION SERVES 600 EMPLOYEES with 11 wash fountains, 25 wash basins and 3 service sinks.

WE ALSO MAKE...



TEMPERING VALVES
to prevent excessively hot water



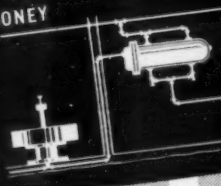
OIL HEATERS
OIL COOLERS

ELECTRIC PUMPS
for circulating water, oil and other liquids

HEAT EXCHANGERS
to utilize wasted heat

JUST KNOWING WHERE TO PUT THE WATER HEATER CAN SAVE YOU LOTS OF MONEY

Makes possible short piping runs to showers and wash fountains. Steam is consumed only during the few hours a day the washroom is used.



THE WORLD'S LARGEST MANUFACTURER OF HEAT EXCHANGERS

Taco

TACO HEATERS, Incorporated • 137 South Street, Providence 3, R. I.

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TACO HEATERS, Incorporated
137 South Street,
Providence 3, Rhode Island

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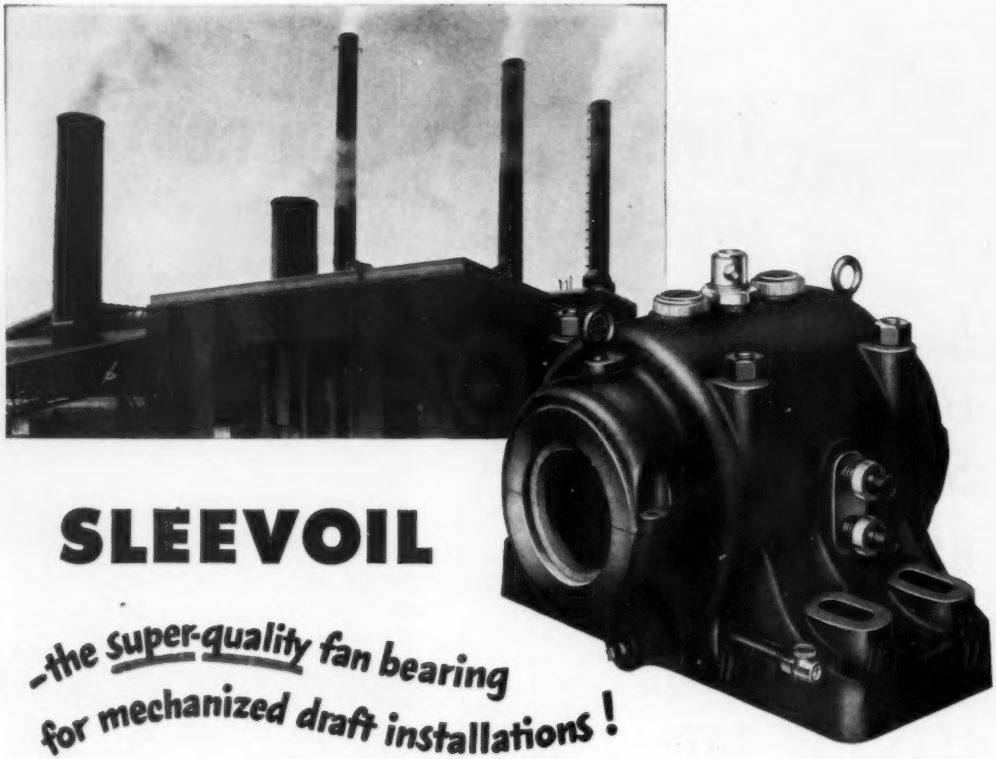
Company_____

Street Address_____

City_____ State_____



SLEEVOIL

—the super-quality fan bearing for mechanized draft installations!

● Hundreds of generating plants in America run on Dodge Sleevoil Bearings. These famous bearings combine quietness, long life and dependability to a degree unique in the bearing field. They offer engineers of costly power plants a priceless safeguard for their equipment.

Sleevoil Bearings are a Dodge development—created especially to meet the exacting requirements of fan and blower service. They are ideal bearings for important installations calling for induced or forced draft. Designed in cooperation with engineers of leading fan and blower manufacturers, they have a long record of dependable performance in critical service.

Dodge Sleevoil Pillow Blocks are normally available from stock—in both plain and water-cooled types, in shaft sizes from 1-7/16" to 8". Write us for information.

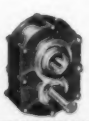
DODGE MANUFACTURING CORPORATION
2700 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

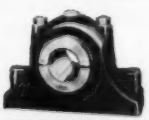
CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on *modern* power transmission machinery for *modern* installations. Look for his name under "Power Transmission Equipment" in your local classified phone book.

FIRST IN POWER TRANSMISSION MACHINERY!

SEALED-LIFE V-BELTS; TAPER-LOCK SHEAVES



TORQUE-ARM SPEED REDUCERS



DODGE-TIMKEN PILLOW BLOCKS

ROLLING GRIP AND DIAMOND B CLUTCHES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

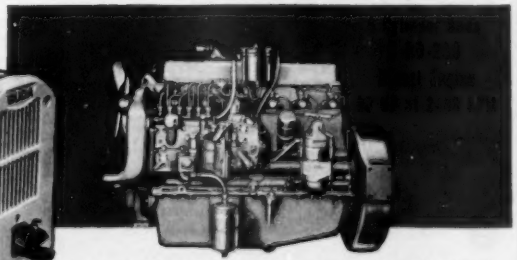
BUDA

Ask your nearby Buda Material Handling Distributor about Buda Diesel Powered equipment. He has the facts. Write for Bulletins and specification data. THE BUDA COMPANY, HARVEY, ILLINOIS.

A-14-V TOWING TRACTOR....2400 lbs. draw bar pull

BH-25

Model HA-120 Tractor with Torque Converter...12,000 lb. draw bar pull



Buda Towing Tractors are available with Diesel or Gasoline power in 2400, 4500, 7500, 9,000, 12,000 pound draw bar capacities.

BUDA

..The Line with ALL 3 for Diversified Handling

Manufacturers of Diesel and Gasoline Engines, Maintenance of Way Products, Lifting Jacks, Earth Drills and Material Handling Equipment

The Control Center that OUTSMARTS ACCIDENTS

No longer is it necessary to expose personnel to "hot" buses or to sacrifice safety to gain accessibility to your control centers. Removal and replacement of Westinghouse Starter Units is safe and simple. "Magna-Grip" stab connectors simply "plug-in" to the power bus.

To work on the panel, starter unit may be withdrawn to a tilt-out disconnect position and locked. The unit is "dead"... completely disconnected from the power bus and self-supporting in this position. Protection is assured since it is impossible to reach around the starter unit and touch the bus.

For work on the bench, it is a simple matter to remove the complete starter unit. Note that the *unit door remains on the panel* so that it can be closed to guard the exposed bus. Rigid guide rails in the structure facilitate replacement of the starter unit. These rails align the starter and steer the "Magna-Grip" stab connectors into accurate contact with the power bus.

Westinghouse Control Centers offer still more points of safety.

For example:

Complete baffling to localize unusual arcing if faults occur.

Interrupting capacity of each starter not less than 15,000 rms amps.

Self-cooling construction for foolproof ventilation.

Sturdy structures that are self-supporting.

Get all the facts as presented in booklet B-4213 from Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-27008

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

WESTINGHOUSE

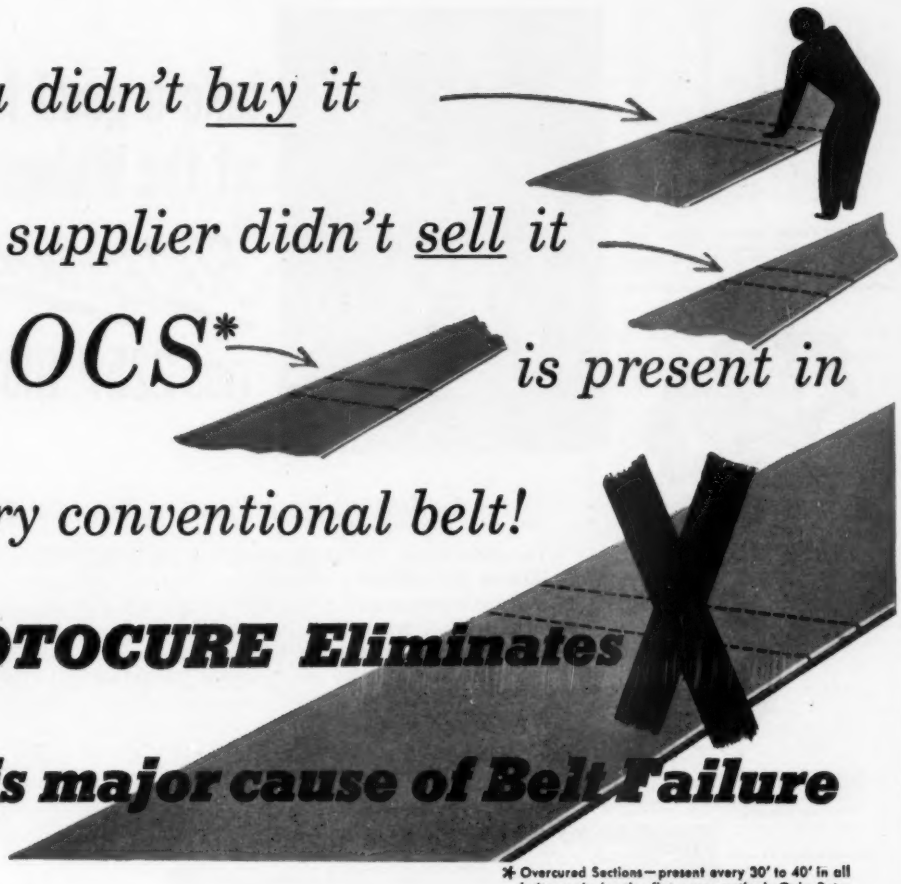
CONTROL CENTERS

You didn't buy it

the supplier didn't sell it

but OCS is present in*

every conventional belt!



ROTOCURE Eliminates

this major cause of Belt Failure

* Overcured Sections—present every 30' to 40' in all belts made by the flat press method. Only Rotocuring eliminates this major cause of belt failure.

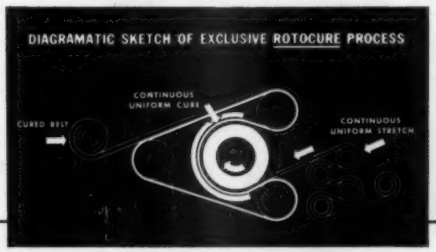
Many of the premature failures of conventionally-made conveyor belts can be attributed to *overcured* or *double-cured* segments of 2" to 4" wide across the entire belt. These "Achilles Heels" occur every 30 to 40 feet and cannot be eliminated in conventional or flat press curing because the earlier cured sections in this "stop and go" operation move forward *less than a full press length* each time.

Realizing that continuous vulcanization was the solution (and the *only* solution) to this problem, BWH technologists developed ROTOCURE. In this BWH *continuous* curing process, press overlapping is impossible, overcuring is completely eliminated and flex life steps up as much as 40%.

What's more, users of BWH ROTOCURED belts have found that ROTOCURE eliminates mechanical distortion at the press ends . . . assures constant, uniform stretch . . . provides uniform, abrasion-resistant covers.

It all pays off in longer belt life, less maintenance and appreciable cost per ton savings in material conveyed. Ask your BWH distributor or write us direct.

You'll find these advantages in BWH rotocured transmission belts, plus a higher coefficient of friction since no dusting agents are needed. Because of this, you can operate at lower tensions — an additional factor contributing to longer belt life.



BWH — DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

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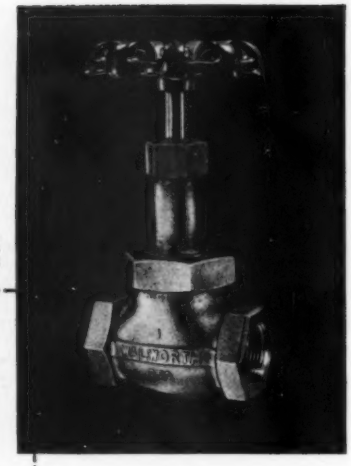
IDENTIFICATION DISC: An aluminum marking plate on all Walworth No. 225P's facilitates inventory control and makes reordering quick and positive.



take a good look at the Walworth "500 Brinell" no. 225P Globe

NEWLY DESIGNED HANDWHEEL: Patented air-cooled, finger-fit handwheel affords sure grip even with greasy gloves.

– the Toughest Bronze Valve Your Money Can Buy

The stainless steel, corrosion resistant seats and discs are heat treated to a hardness of 500 Brinell – hard enough to scratch glass and crush nails! The valve can be closed on sand, slag, and pipe scale without injury to the seating surfaces. "Wire drawing" is practically eliminated. All parts are accurately machined and gaged. Years of tight, positive shut-off are assured.

Available in both globe and angle types (angle type: No. **227P**) in sizes ¼" to 2", this quality valve is recommended for 350 lbs. W.S.P. at 550 F, and 1000 lbs. non-shock service on cold water, oil, gas, or air.

For full data on this long-life, economical Walworth Bronze Valve, see your local Walworth distributor, or write for Circular.

IMPROVED PACKING: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure when fully opened.

note these 7 Great Features

HEXAGONAL UNION BONNET CONNECTION, DEEP STUFFING BOX AND RUGGED STUFFING NUT: Union bonnet connection eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and reassembled.

OVERSIZE STEM: The high-tensile strength silicon-bronze stem assures long life and protection against wear.

SEATS AND DISCS: Plug type seats and discs of stainless steel, heat-treated to 500 Brinell hardness and machined simultaneously to a mirror-like finish, with accurate tapers assures tight positive shut-off with minimum handwheel effort.

EXTRA STRONG BODY: Made of Composition M (ASTM B61) bronze. Thick walls and rugged hexes provide a high safety factor. Valves undergo hydrostatic shell test of 3,000 psi.

WALWORTH

valves and fittings

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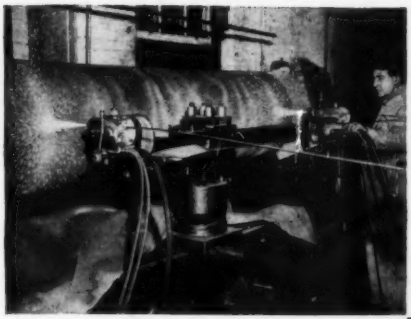
how to S-T-R-E-T-C-H

"Maintenance & Operating Supplies" Dollars under NPA regulation No. 4

With metallizing you can salvage worn or damaged machine parts for a fraction of their replacement cost—many for as little as 10 or 15% of their present value.

Just consider what this can mean to your plant. For instance, a good sized steel alloy processing roll might cost you as much as $3,000 to replace. With metallizing you can resurface the roll and build up worn areas on the journals for as little as $300 or $400—and use the precious dollars you save from your quarterly M&OS allotment for other vital parts or repairs where you can't use a money-saving tool like metallizing.



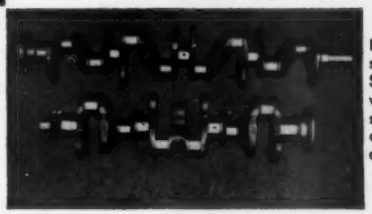
Metallizing surface of cast iron creeping roll with 18-8 stainless steel to build up from 22.750" to 23.185" on the 162" roll.

Here's how you can find out for yourself.

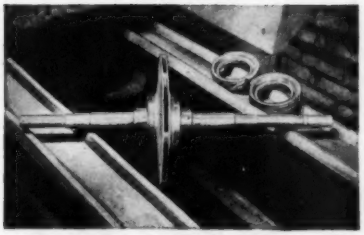
Bulletin 54 shown below illustrates and describes a wide range of machine repair jobs that you can do at low cost with metallizing. It will help to give you an idea of the versatility of this modern machine repair process. But, better yet, if you want the whole story exactly as it applies to your particular operation, a request on your letterhead will bring a full-time, factory-trained Metco field engineer to your plant for a complete survey of the money-saving possibilities of metallizing in relation to your own machine repair problems.

You may have much to gain, and certainly nothing to lose. We are already well into the second quarter of 1951—there's still two to go.

Metco—Reg. U.S. Pat. Off.



Passenger car and truck crank shafts salvaged by metallizing. Shaft throws shown in photo were ground .050" deep and sprayed with .80 carbon steel about .100" thick and machined to size.



Centrifugal pump shaft and seal rings salvaged by metallizing.

METALLIZING ENGINEERING CO., INC.
38-13 30th STREET LONG ISLAND CITY 1, N. Y.
In Great Britain: METALLIZING EQUIPMENT COMPANY, LTD. Chobham near Woking, England

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38-13 30th Street, Long Island City 1, N. Y.
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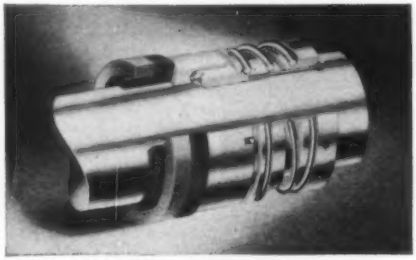
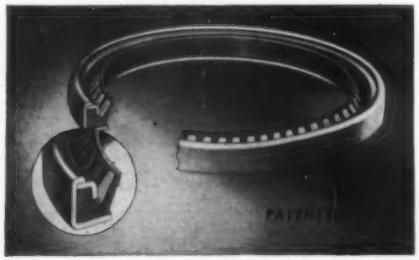


Garlock Mechanical Seals for Rotary Shafts



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Research has brought advanced design, better materials and new uses for thousands of products in American industry.

Here in the completely equipped Garlock research laboratories we have developed new products and have improved our regular line of packings, gaskets and seals with new materials and better designs.

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● Gas mains, cold blast mains, exhaust stacks—in fact, all metal areas around blast furnaces are exposed to corrosive industrial atmospheres. That's why this plant, like so many others where corrosive conditions are unusually severe, relies on Koppers Bitumastic® Protective Coatings to prevent corrosion.

Koppers Bitumastic Protective Coatings provide many years of protection against corrosion where ordinary paints usually fail in months. Koppers Coatings save money in other ways, too. One application of Bitumastic No. 50, for example, equals 5 to 8 coats of ordinary paint.

With 50 to 90 per cent of maintenance and replacement costs directly chargeable to corrosion, it pays to find out the full story of Koppers Protective Coatings. It's detailed in our free illustrated book, "Stop Corrosion." Send for your copy, using the handy coupon.

CORROSION PREVENTION IS OUR BUSINESS

Koppers handles the entire job of protecting industrial plants against corrosion. Here are the steps we take to keep industry's No. 1 enemy under control.

SURVEY—Experienced corrosion engineers will survey your plant and determine where protection is needed . . . how much protection is needed.

MATERIALS—Koppers offers a complete family of Bitumastic Protective Coatings . . . materials for nearly every type of corrosion problem.

APPLICATION—Trained applicators are available to make certain that Bitumastic Protective Coatings are put on correctly to give maximum service.

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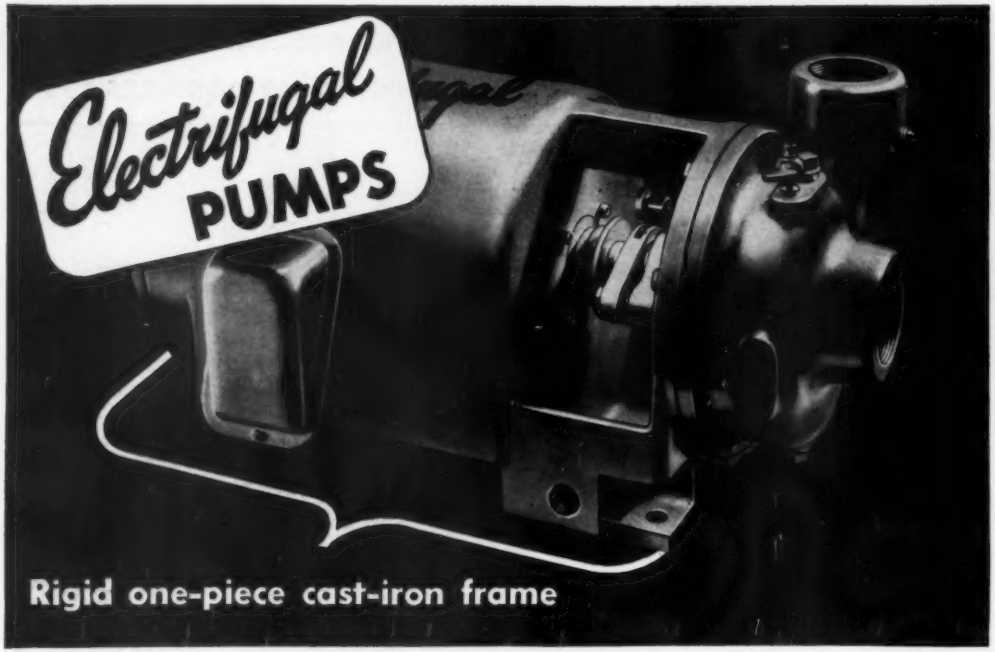

This is the difference between close-coupled pumps

THIS EXCLUSIVE FRAME DESIGN combines maximum space for packing maintenance with exceptional rigidity in a way that no pump assembled to a standard motor can do. Solid cast iron frame with no joints from motor end housing to pump casing assures permanent alignment.

Bearings are lubricated at the factory and should require no attention for years. The stuffing box carries plenty of packing and all parts are generously proportioned for heavy duty service. Wearing rings and shaft sleeves protect casing and shaft from wear and are easily replaced at low cost when worn. As a result, you will find exceptional freedom from high maintenance costs.

Unit Responsibility Means Dependability

Motor and pump are designed for each other and made in the same plant. You have one responsible source for both... one guarantee of satisfaction. Every Allis-Chalmers pump representative is a competent application engineer who will help you select exactly the right pump for your needs. And 94 Allis-Chalmers Certified Service Shops provide nation-wide factory approved service.

Talk over your pump selection problems with your Allis-Chalmers Authorized Dealer or Sales Representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 52B6140.

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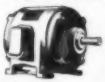

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

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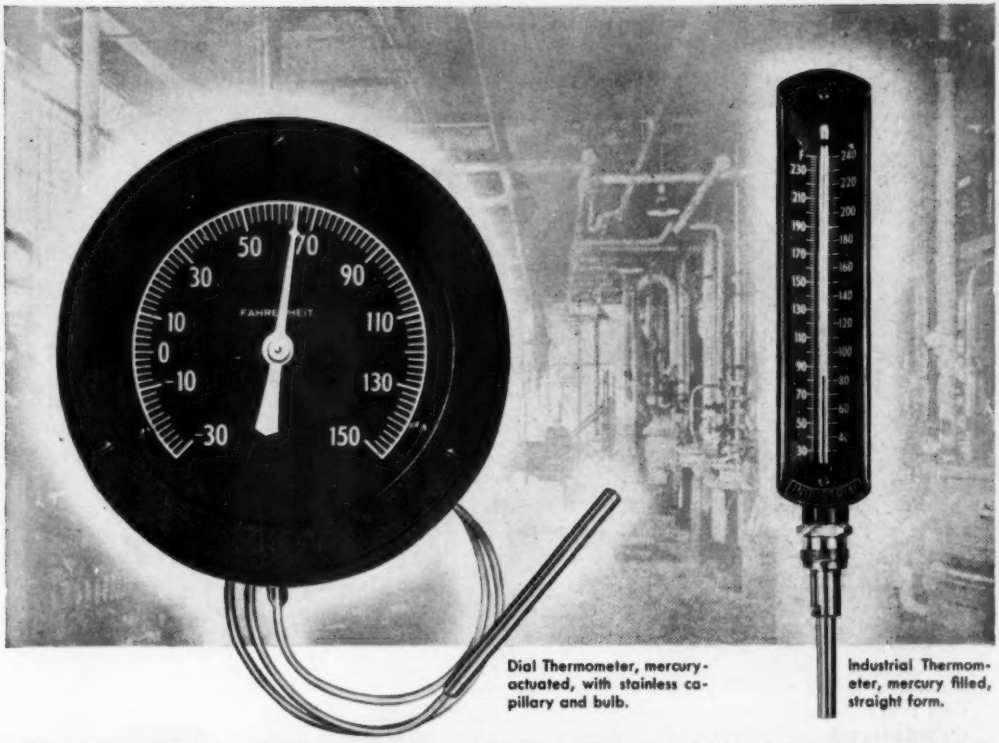


Dial Thermometer, mercury-actuated, with stainless capillary and bulb.

Industrial Thermometer, mercury filled, straight form.

WILL THEY STAY HONEST WHEN THE HEAT'S ON?

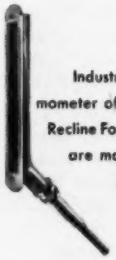
Rigid quality control and thorough testing of every USG Thermometer under actual operating conditions say *they will!*

So does the fact that USG sells no makeshifts. Regardless of your process or application, there's a USG Thermometer that suits it precisely. You may choose Industrial Types in all sizes, and mounting forms with standard or protected stems —or Dial Types in a variety of sizes, case styles, mountings, ranges and connections. *All* USG Thermometers—gas, mercury, or vapor-actuated—are built to the same high quality standards as USG Pressure Gauges!

If you're interested in typical applications of commercial and approved Navy Standards, dimensional information and the use of bushings, flanges, sockets and special tubing, send for Catalogs 100 and 200.

Special thermometers for dough testing, milk testing, fuel gas, candy, solder baths, varnish, canning, vulcanizing and other unusual processes.

Dial Thermometer with bottom-connected rigid stem, one of many USG types available.



Industrial Thermometer of the 45° Recline Form. There are many other standard forms.

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KIRK & BLUM FUME CONTROL SYSTEM

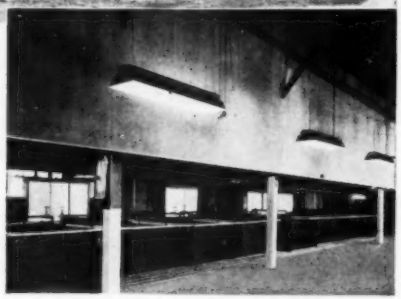
60% More Air Less H.P. Lower Cost

at Estate Heatrola Div., Noma Electric Corp. HAMILTON, OHIO

• Although a conventional duct system would have required as much as 100 H. P., this KIRK & BLUM *ductless* Fume Removal System uses just 40 H. P. to handle 160,000 cubic feet of air per minute . . . doing an excellent job of fume removal at lower initial cost and lower operating cost.

In the plant of this noted stove manufacturer, a battery of ten 8-foot tanks are ventilated by the fume exhaust system shown. Flexibility of capacity is obtained by operation of one or more fans as production requires. Even when baskets containing the parts are lifted from the tanks, the system easily removes all steam and fumes.

Completely designed, fabricated and installed by KIRK & BLUM, this Fume Control System is another example of engineering skill and experience combined to save money for a long list of America's leading plants. For a comprehensive picture of KIRK & BLUM Fume Control Systems, write today for Booklet, "Dust Collecting Systems for Metal Industries".



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Cincinnati 9, Ohio

FOR CLEAN AIR . . . THE [illegible] TOOL

KIRK AND BLUM
FUME CONTROL SYSTEMS

(Continued from page 36)

ing the applications, calibration symbols, conductors, polarity, also ISA, military, and company's own color codes of thermocouple and extension wires. Resistance tables for these wires are shown on the reverse side. Thermo Electric Co., Inc.

144 Tables at Your Fingertips—Booklet B 3677-A is small enough for your vest pocket but its 56 pp are crammed with tables, formulae and other data of value not only in electrical maintenance but in other plant applications as well. Electrical information provided covers everything from terminology to first aid measures for electrical accidents. Includes wire and conduit sizes, formulae for determining amperes, kilowatts and kva, power factor correction, voltage drop tables, wire calculations, full load current of motors, explanations of graphical symbols and other useful data. Westinghouse Electric Corp.

INSULATING MATERIALS

146 Block Insulation—This folder tells economic advantages of company's Superex, listing properties of this high temperature block insulation. Includes conductivity and heat loss graphs and a table showing recommended thicknesses. Special shapes in which this insulation can be furnished are pictured. Johns-Manville.

147 Incombustible Material—"The Story of Kaylo," 24 pp, serves to introduce company's new basic material, an hydrous calcium silicate product, covering some of the many uses for this incombustible material in construction and industrial fields. Tells how product was developed, describes its properties, tells densities available for thermal, insulating and structural applications; illustrates available forms. Kaylo Div., Owens-Illinois Glass Co.

148 Refractories and Insulations—Here's a comprehensive collection of data on company's refractory and insulating materials. It shows when and how to use the various types of materials in industrial, heat processing and heat generating equipment of all kinds. Refractories covered include castable cements, chrome base castable cements, air- and heat-setting bonding cements, and ramming-type refractories. Insulating materials include block and blanket types, plastic heat insulations, electrical insulations and surface protective coatings. About 38 pp in all, sheets are loose-leaf bound. Refractory and Insulation Corp.

PIPING, VALVES, FITTINGS

149 High Pressure Gate Valve—Described in Form DH-273 is a forged steel gate valve designed for long service and low cost maintenance. Cutaway drawing shows construction features. Working pressures, sizes and prices listed, also available materials. R-P & C Valve Div., American Chain & Cable Co., Inc.

150 Underground Steam Conduit—Eight-pp, well-illustrated Bulletin 311 describes a complete underground pipe conduit system for permanent protection, support and insulation of underground pipe lines. Includes specifications and a typical plot plan. H. W. Porter & Co., Inc. —Reid Hayden, Inc.

151 Stainless Welding Fittings—Sixteen-pp Catalog 1651 describes manufacturer's lightweight Schedule 5 and 10 IPS size stainless steel welding fittings, available for wide industrial application, for use with light gage pipe. Gives physical characteristics of the fittings, full dimensional information on elbows, laterals, tees, crosses, reducers, adapters and flanges. Gives tips on assembling of fittings, tells how to order them. Tri-Clover Machine Co.

MECHANICAL POWER TRANSMISSION

152 Booklet on Transmission Belting—Here's an informative 16-pp booklet on treated leather belting which includes practical maintenance suggestions and engineering data. Well illustrated, contains information on making belts endless on pulleys, types of motor bases, fasteners, lacings, cement, preservatives and repairing belts. Helpful belt formulae are included, along with a table on horsepower rating of shafting of various diameters at various speeds. Company's patented tread feature and special mineral tannage are explained, pictured. Specific applications are illustrated. E. F. Houghton & Co.

153 Industrial Roller Bearings—Catalog 51, 56 pp, illustrates and describes company's line of pillow blocks, flange units, flange cartridge units, cartridge units, duplex units, unmounted roller bearings etc. Explains ConCaVex design incorporated in company's bearings to provide integral self alignment, high shock load capacity and extra-low friction. Also of interest are new and larger models of mounted bearing units with standard shaft sizes now available up to 5-in. dia. Includes complete engineering and load rating data, illustrates many product applications. Shafer Bearing Corp.

COOLING, HEAT TRANSFER

154 Roof Cooling System—How roof cooling is justified in terms of greater working comfort, roof preservation and reduced air conditioning costs is explained in illustrated Bulletin 20. Gives specifications, other details of company's spray canopy system. Water Cooling Corp.

155 Spray Nozzles—Bulletin N-617 provides 20 pp of application and ordering data on involute nozzles for spray cooling ponds and fast-spray nozzles for industrial processes. Includes discussion of recooling water by spraying, construction suggestions for spray ponds, photos of typical spray cooling systems, and industrial spray nozzles. Also gives full capacity and dimensional data. Yarnall-Waring Co.

156 Faster Tank Heating, Cooling—Bulletin IP-250, 8 pp, describes company's Platecoils, embossed metal sheets welded to form compact units through which required heating, or cooling, medium is circulated under pressure. Explains lower costs, faster tank cooling or heating, lighter weight and compactness of these units, lists other advantages. Includes specifications, suggested uses, photo of typical installation. Kold-Hold Mfg. Co.

157 Jacket Water Coolers — Illustrated Catalog 1251 describes a line of engine jacket water coolers described as extremely rugged units capable of withstanding abuse of portable equipment installations. Details the many new design features of the new units and describes accessories available equipment. Young Radiator Co.

158 Heat Transfer Surfaces—Bulletin ID-151 illustrates a variety of specialized heat transfer surfaces developed for industrial products and processes. Surfaces shown are applicable to such equipment as solvent recovery, intercooling, regeneration, gas separation and liquefaction, heat economizing and drying. Includes types providing up to 350 sq ft of surface per cu ft of volume. Modine Mfg. Co.

159 How to Save Waste Heat—The utilization of unit heaters for recovery and distribution of waste heat from engine and compressor jacket water is covered in 4-pp Form 00531A. Method of using waste heat to lower space heating costs is explained. Several installations are detailed to illustrate piping hookups, control methods. Bulletin also shows how to select correct size and type of heater, and basic hot water capacities are included. Modine Mfg. Co.

OIL BURNING

160 Oil Burning System—Bulletin 109-B, describing a constant differential pump system for use on oil combustion installations, explains what this wide range system is designed to do, and discusses and illustrates principle of control. A steam flow chart from one of the boilers at a large steam station is pictured, as are some installations of this pump system. Peabody Engineering Corp.

161 Data on Oil Burning—"Oil Burning Manual of Information" is a 4-pp guide to proper installation and operation of oil burning equipment. Filled with tables and formulae covering air flow through airports, available draft, excess air, boiler pressure and flue gas temperature, air volume capacities. Published in the interest of increasing oil burning efficiency this bulletin is instructive and saves a lot of calculation. Cleveland Fuel Equipment Co.

DIESELS, TURBINES

162 Diesel Engines—Four-cycle, direct injection, totally enclosed diesels for industrial and municipal plants are the subject of Bulletin S-500-855A. Photos show component parts and large sectional drawings illustrate design features. Full specifications presented, operation explained. Economy, simplicity described. Worthington Pump & Machinery Corp.

163 Electricity as Required—This 16-pp booklet illustrates wide usage of manufacturer's diesel electric sets on various power applications. Briefly outlines specifications of models from 21 to 314 kw. A special chart for self-regulated and externally-regulated sets is also featured. Additional information covers available attachments, simplicity of construction, portability, performance characteristics of the sets. Caterpillar Tractor Co.

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July, 1951

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164 Fifty Years of Turbines—This attractive anniversary booklet provides 46-pp of interesting reading on turbine history as experienced by a large manufacturer of this equipment since 1901. It's filled with photos of early and recent models and also covers development of pumps, blowers and compressors, and speed reducers. De-Laval Steam Turbine Co.

TOOLS

165 Air Tool Catalog—Screw drivers, nut setters, sanders, drills, grinders, rammers, and chippers and scalers are presented in Bulletin 38, 44 pp. Well-illustrated with photos and sketches, this book contains a great deal of helpful application information as well as complete dimensions and ordering details. The Motor Tool Co.

166 Installation and Maintenance Tools—Sixteen-pp Bulletin 451 is company's recently published ordering book covering installation and maintenance tools. Presents air motors for tube rolling, buffing and polishing tools, calipers, ratchet wrenches, jigs, plug pullers, boring bars, rethreading tools, and gaskets. A section on tube expanders illustrates major types, gives their applications, dimensions, prices; includes a tube expansion chart. Key Co.

167 Powerful Puller—Introduced in Bulletin 97-A is the compact Power-Twin, a fast-working hydraulic ram designed to take the hard work out of pulling jobs. Shows how this ram, with its center hole feature, can convert all of company's pulling systems to hydraulic push, pull or lift operation. Pictures time-saving methods for installing and removing cylinder sleeves, shafts, gears. Also shows conversion sets, bench presses, includes prices. Owatonna Tool Co.

LIGHTING, COMMUNICATION

168 Industrial Lighting-at-Work—Sixteen-pp Booklet B-4727 stresses three ways of putting better lighting to work for the plant engineer: cutting costs by making possible increased production; increasing efficiency by ensuring accuracy, and reducing accidents by exposing dangerous operations. In emphasizing that different operations call for varying amounts and types of light, booklet analyzes fluorescent, mercury vapor and incandescent light sources as to light efficiency, service life, maintenance, mounting height and job suitability. Luminaires of each type are pictured, wattage and lumen output ratings given. Special lighting for special areas is shown. Westinghouse Electric Corp.

169 For "Down Under" Lighting—Bulletin 601 describes company's Anchorlite, a suspended underside and inside illuminator. Explains and pictures its uses in railroad freight car and truck trailer loading, repair shop and storeroom bin lighting. Installation details and required fittings also given. The Pyle-National Co.

170 Civil Defense Communications—Twelve-pp Form G93-122 pictorially presents typical communications systems now in use which can be coordinated into a dependable emergency communications network in any community. Also describes company's technical advisory service for civil defense radio communications, listing representatives in 22 district offices who are available to analyze existing systems and recommend methods of forming them into a single network to operate in any emergency. Electronics Dept., General Electric Co.

OTHER EQUIPMENT

171 For Foundry Cleaning Jobs—Twelve-pp Bulletin 1110 on manufacturer's Hydro-Sand Blast explains how this system utilizes a powerful stream of sand and water to solve economically the core knockout and casting cleaning problems of foundries. Also details the application of a special machine for cleaning heat exchanger tubes and gives specifications of two standard machines. Well illustrated throughout; section on core knockout and casting cleaning shows by picture and text how the externally operated machine makes a safe, easy job of a formerly difficult one, and tells how the machine is controlled and operated. Pangborn Corp.

172 For Power Plant and Industry—Liberally illustrated, this attractive booklet (Bulletin Q-14) reviewing manufacturer's complete line, describes briefly the major steam and electrical products of the company's plants. Different sections cover steam and related equipment (turbines, centrifugal blowers, condensers, tube cleaners) and rotating electrical equipment. Elliott Co.

173 JIC Pneumatic Standards—The Joint Industry Conference's recently adapted standards on pneumatics are offered to plant engineers in a 12-pp illustrated booklet. In it the "Standards" are reproduced in full, with sample circuit, glossary of terms, standard symbols, also a comparison showing how company's air cylinders meet the JIC Standards. Booklet is hole-punched for standard ring binders. Miller Motor Co.

174 Weed Control Manual—Data on methods and results in chemical brush and weed control, as practiced by a wide range of organizations, are outlined in this 12-pp operations manual. Includes records of brush control experience of telephone companies, power companies, a soil conservation experiment station, etc. In each case, methods of chemical control of undesirable growth which have been most satisfactory are presented along with cost data and evaluations of short-term versus long-range control programs. E. I. du Pont de Nemours & Co., Inc.

175 Got a Water Problem?—Sixteen-pp Bulletin 501 tells how company can help both those plants doing their own testing and treating and those requiring outside laboratory services. Summarizes briefly 10 impurities common in water, damage caused by them and ways to combat them. Describes products and services offered in treatment of boiler water, water lines, cooling water systems, brine systems, also waste water treatment, zeolite softener treatments and consulting services. Brooks Chemicals, Inc.

176 How to Cut Waste Costs—A factual treatise, "Four Ways to Economize on Industrial Wastes," discusses briefly main types of industrial wastes and special problems involved in their handling. Explains ways of coping with waste costs by reduction of waste volume, by improved processing methods, by conversion of wastes to by-products and by treatment. Gilbert Associates, Inc.

177 Tips on Plant Protection—Instructive information for engineers whose plants are engaged in defense production is furnished in this 16-pp revision of a manual used widely during World War II. It is intended to solve plant protection problems by instituting security systems for preventing loss of life, damage to property and sabotage of war material. The training of watching personnel, planning of hourly rounds, safety factors, fire prevention are among subjects discussed. Detex Watchclock Corp.

178 Equipment for Liquefied Gases—This illustrated booklet summarizes company's work in production, handling and storage of liquefied gases. Briefly describes a hydrogen liquefier, liquor oxygen generator, helium refrigerator, liquid-oxygen pump, other equipment applicable to work with liquefied gases or to low temperature investigations. All equipment shown is now available and much of it stems from recent developments. Arthur D. Little, Inc.

179 For Tramp Iron Removal—Sixteen-pp Catalog 15 is a new and excellent source of material on non-electric permanent magnetic separators for tramp iron removal. Complete descriptions of separators, engineering data including photos, drawings and tabular specifications are given. Selection information and factory engineering service available are included, also explanation of the life of permanent magnets. Erien Mfg. Co.

180 1951 Film Guide—Seventy-two sound films covering general interest subjects, product information and training and instruction are listed in Catalog B-4761, company's new 76-pp listing. Divided into sections for easy reference, this catalog describes each film, tells the people it should interest, the film size, projection time, shipping weight etc. Typical films are, "Electrical Proving Ground," and "Hints on Electrical Servicing in the Air-Conditioning Industry." Basic rules of operation, ordering, borrowing information included. Westinghouse Electric Corp.

181 For Cleaner Coal Burning—This 8-pp illustrated bulletin describes company's Turbo-Aire over-fire systems designed for cleaner coal burning. Explains how they work to eliminate smoke and promote efficient combustion. Includes selection chart, specifications, fan data and characteristics. Canton Stoker Corp.

182 Vapor Degreasing Handbook—This 31-pp book on vapor degreasing of metal parts answers most questions generally asked about vapor degreasing, covering the subject of what vapor degreasing is and to what types of materials and manufacturing vapor degreasing can be applied. Photos of various types of units along with useful data charts are also included. The Phillips Mfg. Co.

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Here are two big jobs Westinghouse Bus Duct can do for you. One . . . provide a secondary power distribution system that is quickly and economically installed. Two . . . provide power at the point of use that is flexible for change-overs at any time.

Prefabricated sections of Westinghouse Duct, in any required length (10-foot maximum), are convenient to handle and mount. Ordinarily difficult or tight layouts are no problem with standardized tees, elbows and cross-overs. Simply suspend with cantilever hangers and bolt units together.

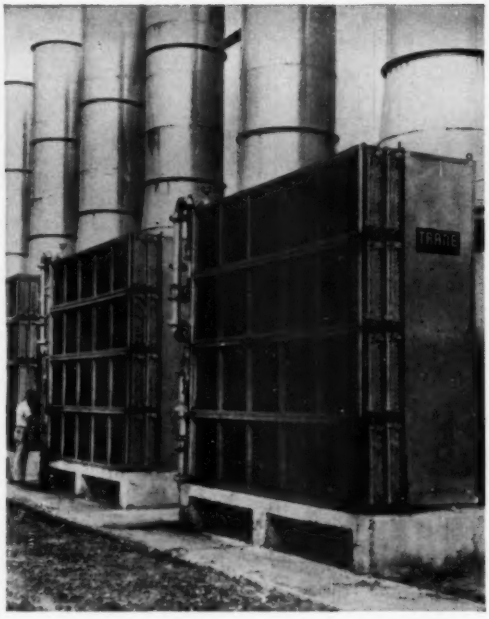
Plug-in receptacles every foot speed machine tie-ins, simplify the job of changing over or adding to production lines—without changing the distribution system. No wire mazes to unravel. No cable to splice. To relocate duct, just dismantle, rearrange, remount. All equipment is salvageable. Production line down time is held to a minimum.

For the full story, call your Westinghouse distributor, or write for Manual B-4272-A, Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

J-30060

YOU CAN BE SURE... IF IT'S Westinghouse BUS DUCT

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY



Laboratory . . . Reduction Plant . . . Assembly . . . Dock . . . Service Station

Trane Air Conditioning Serves Everywhere in Industry

Industries of every kind and size are finding the answers to their heating and air conditioning problems in the broad Trane line.

Constant Temperature Fog Room—A cement manufacturer wanted to test concrete specimens under extreme humidity conditions, at constant temperatures. Trane Climate Changers kept the test room at 73° constantly the year around.

To Cool Gas Engines—The location of a new aluminum reduction plant in the south had plenty of natural gas and good transportation. But there was no water to cool the 120 1800-hp engines used for power. This situation was remedied when 120 Trane Fluid Coolers were installed to keep jacket water at just the proper temperature.

Window Blanketing – The windows in the new plant of a scale manufacturer admitted plenty of light to a delicate assembly line. But the great glass area created greater possibilities for drafts. That is until Trane Wall-Fin Heaters were installed to blanket the windows with heat without obscuring the light.

Washing the Walls with Heat – Long loading docks, like the one in a Michigan chemical plant, call for a lot of heat to combat the cold air from constantly opened doors. A battery of Trane Horizontal Unit Heaters wash the exposed walls and blanket the doorways with all the heat that's needed.

Tempering Freezing Air – The diesels of a famous railroad discharge a lot of gas-laden air as they enter a terminal service station. As the bad air is exhausted, clean outside air is brought in and heated with Trane Nonfreeze Heating Coils.

Whether it's laboratories, reduction plants, assembly, docks or service stations, Trane air conditioning serves industry everywhere.

Whatever your factory heating, ventilating, cooling or air conditioning problem, look for the answer in the complete Trane line.

In Assembly Departments—Trane Wall-Fin Heaters are tucked up under the girders.

In Loading Areas—Trane Horizontal Propeller Unit Heaters kill drafts before they start.

In Service Stations—Cold outside air is heated with Trane Coils before it is used for ventilation.

TRANE

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pennsylvania
Trane Company of Canada, Ltd. . . . Toronto
OFFICES IN 80 U. S. and 14 CANADIAN CITIES

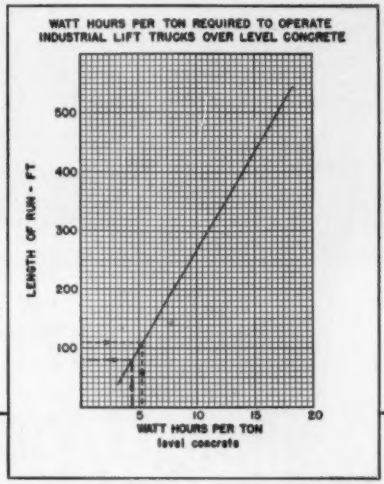
GOULD

Plus-Performance Plan ...TELLS YOU HOW TO

SELECT YOUR BATTERIES TO FIT YOUR JOB!

You can increase battery performance as much as 50% through the help of the GOULD PLUS-PERFORMANCE PLAN! Here is a complete and integrated system of manuals, articles, specifications, bulletins, record cards and charts which explain and illustrate how to select, charge and handle, maintain and determine the condition of your batteries.

Designed to help you conserve and extend your essential battery power, the GOULD PLUS-PERFORMANCE PLAN is FREE to ALL battery users without obligation. A request on your letterhead will bring descriptive literature by return mail.

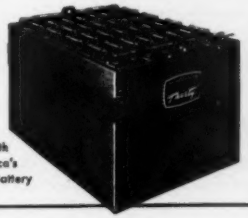


AN EXAMPLE OF PLUS-PERFORMANCE PLAN HELPFULNESS

Selection Requires Route Analysis

Battery selection should be made only after careful analysis of the route truck will travel and the load it will handle. Knowing weight of truck empty, amount of average load, average length of run and length and percent of grades encountered, simple, easy formulas enable you to calculate the battery capacity needed for 1) level run loaded; 2) going up grade; 3) return trip empty; 4) lifting; 5) tilting. The sum of these five computations gives total watt hours necessary for trip. Multiplying by trips a day gives total daily watt hours required. Dividing this total by battery voltage required gives minimum battery capacity for the job.

This graph plus easily worked formulas enable you to compute required watt-hours.



Gould "Thirty" with "3" plates—America's Finest Industrial Truck Battery

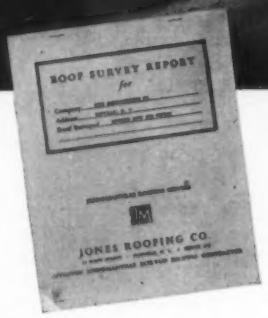
GOULD STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries

DON'T TAKE YOUR ROOF FOR GRANTED

Get a Roof Survey Report *free* of charge!



The Built-Up Roof Survey Report tells exactly what condition your roof is in, gives you a permanent record, helps you plan ahead for roofing maintenance. Get this *free* survey made *now!*

Even though your roof doesn't *seem* to be leaking, it may be in need of attention. Many a roof with torn flashings, dried-out felts, even rotted decks has been assumed to be in "good condition."

To anticipate costly damage, often hidden, and numerous repair bills, hundreds of plant engineers and maintenance executives have already used the free Johns-Manville Roof Survey Report.

The Roof Survey Report is an accurate picture made by a roofing *expert*, the J-M approved Built-Up Roofing Contractor. It covers all critical areas —flashings, decks, roofing felts, parapet walls, skylights, etc. And it will cost you only the trouble of asking for it.

Let us send you the interesting booklet, "Things You Should Know About Your Roof." It gives complete information about the *free* J-M Roof Survey Plan together with the full story of J-M Flexstone* Asbestos Roof and the Asbestile* Flashing System. Write Johns-Manville, Dept. FM, Box 158, New York 16, N. Y. In Canada, write 199 Bay St., Toronto 1, Ontario.

*Reg. U. S. Pat. Off.

Mail your Request today

Johns-Manville, Box 158,
Dept. FM, New York 16, N. Y.

Please send me the free booklet, "Things You Should Know About Your Roof", and have your Approved Built-Up Roofing Contractor see us about making a free survey.

Name_____

Address_____

_____

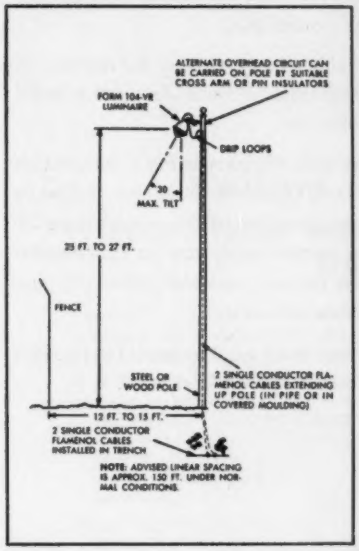
Made of ASBESTOS

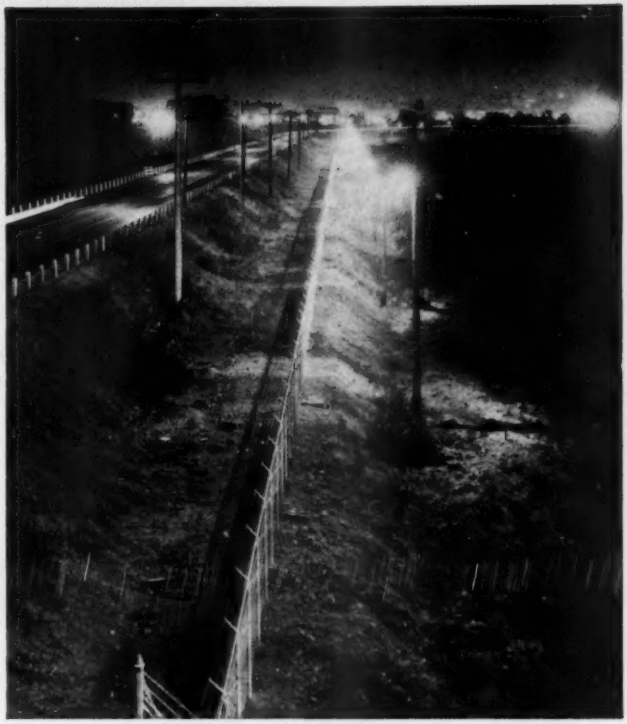
Johns-Manville *FLEXSTONE* Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE* • ACOUSTICAL CEILINGS

DECORATIVE FLOORS • MOVABLE WALLS • ETC.

OUTDOOR INDUSTRIAL LIGHTING


ALTERNATE OVERHEAD CIRCUIT CAN BE CARRIED ON POLE BY SUITABLE CROSS ARM OR PIN INSULATORS
FORM 104-VR LUMINAIRE
DRIP LOOPS
30° MAX. TILT
25 FT. TO 27 FT.
FENCE
STEEL OR WOOD POLE
2 SINGLE CONDUCTOR FLAMENOL CABLES EXTENDING UP POLE (IN PIPE OR IN COVERED MOULDING)
12 FT. TO 15 FT.
2 SINGLE CONDUCTOR FLAMENOL CABLES INSTALLED IN TRENCH
NOTE: ADVISED LINEAR SPACING IS APPROX. 150 FT. UNDER NORMAL CONDITIONS.



HIGH VISIBILITY along the fence is obtained by using G-E Form 104 VR luminaires. These units are equipped with a Universal Bracket with either external binding posts or cable-inlet bushings for series or multiple circuits.

INTRUDERS can't penetrate this "wall of light" without detection. At the same time, 6,000 or 10,000-lumen lamps keep operating costs down to reasonable levels.

How to Get Extra Protection with Modern Boundary Lighting

If the boundaries of your plant need 24-hour protection, a well-planned lighting system adds a lot to security at surprisingly little cost.

But it's important to get adequate illumination, for high visibility along the fence, without glare annoying to guards or adjacent property owners. The lighting must be effective in any weather, with safeguards against emergency outages.

A typical boundary-line installation uses G-E Form 104VR luminaries on 25-ft poles, 150 feet apart, as shown in the sketch above. Uniform two-way light distribution, with excellent lateral shielding, is the result.

To protect your plant property and to expedite plant traffic, illuminate loading platforms and parking lots. Whatever the need—General Electric has equipment matched to the job. The latest methods and layout guidance, too, are available to you from the lighting specialist at your local G-E office. You'll find valuable suggestions in the new bulletin, "Outdoor Lighting for Industrial Plants." For your copy, write Section 451-164, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

451-164

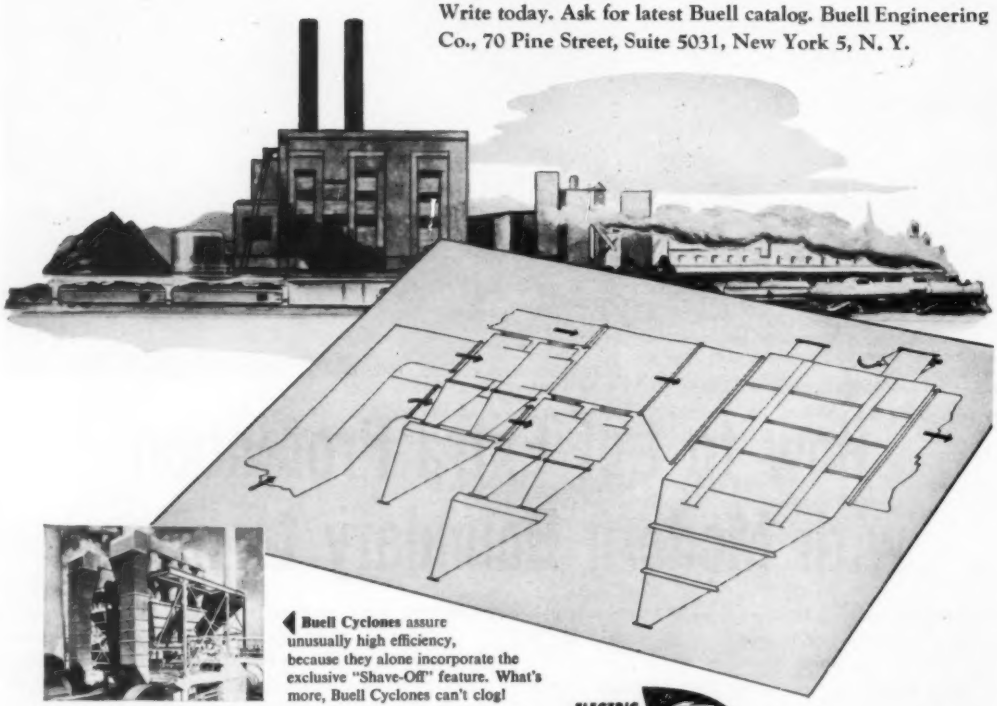
TOP TEAM FOR PEAK FLY ASH COLLECTION

Industrial engineers agree that the ultimate in Fly Ash Collection Efficiency is best achieved when you team up a mechanical collector with an electric precipitator.

Such highly efficient combination systems for the recovery of Fly Ash in your plant are products of Buell—for years, a leader in the science of dust collection.

How to help you achieve peak efficiency in Fly Ash collection is the prime function of Buell engineers. These men, backed by years of experience in weighing the factors which determine the most efficient and economical equipment for each installation, will be pleased to discuss your particular problems at your convenience. No obligation, of course.

Write today. Ask for latest Buell catalog. Buell Engineering Co., 70 Pine Street, Suite 5031, New York 5, N. Y.



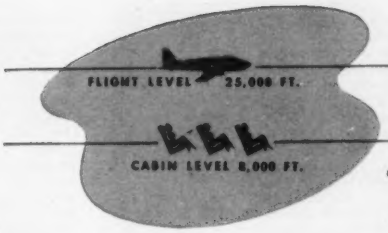
Buell Cyclones assure unusually high efficiency, because they alone incorporate the exclusive "Shave-Off" feature. What's more, Buell Cyclones can't clog!

Buell 'SF' Electric Precipitator, too, boasts highly favored advantages for sustained efficiencies: StediFLOW Dust Fall assured through a carefully timed, continuous-cycle rapping mechanism. Exclusive self-tensioned Spiralectrodes for greater corona emission.

ELECTRIC CYCLONIC

buell

Engineered Efficiency in **Fly Ash Recovery**



In modern air-liners you breathe comfortably at altitudes of 25,000 ft., because your cabin is "Pressurized" — air pressure inside the plane is kept at or near normal sea level pressure.

Boilers, too, "breathe" easier when their combustion air is "pressurized" using forced draft

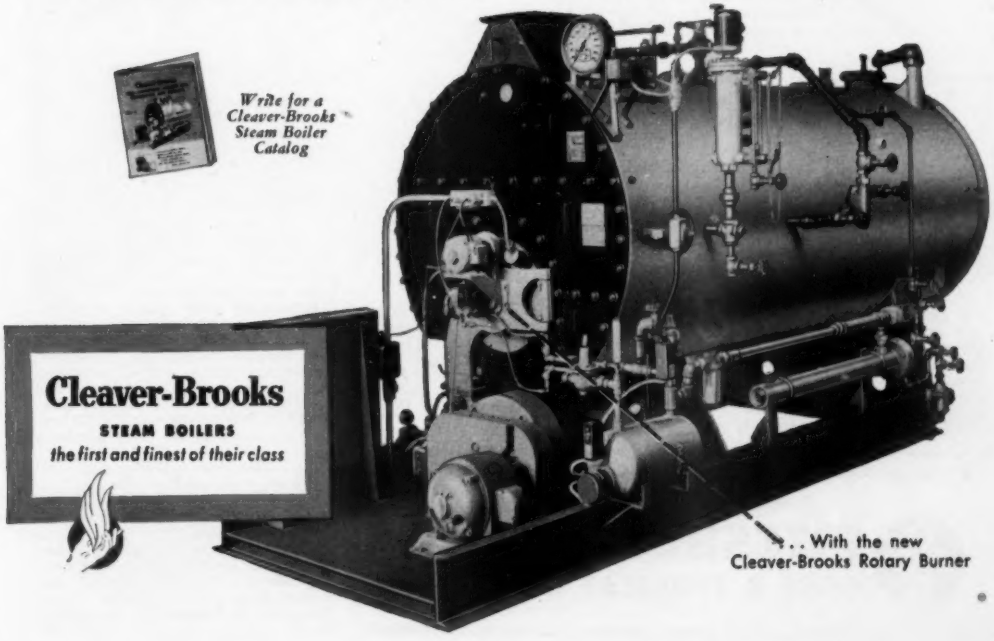
Cleaver-Brooks experience with thousands of steam boilers, of the self-contained type, has conclusively proven these operating advantages of forced draft:

- — because atmospheric boiler-room air is constant in temperature and therefore in density, the weight of air delivered for combustion by a forced draft fan is also constant and always gives proper air-fuel ratio (CO_2) resulting in maximum efficiency and freedom from combustion problems.
- — the electrical load, or power requirement, of a forced draft fan is at a minimum, because the fan handles a lesser volume of air.
- — low fan maintenance and longer fan life with forced draft fans since they operate with cool, clean boiler room air — no problems with high bearing temperatures and corrosion.
- — air is under pressure in the combustion chamber of a forced draft boiler, with no possibility of "diluting" air entering the chamber. Maximum boiler efficiencies are always attained when head plates and casings are tight.
- — lower initial fan cost, better space arrangement, and better appearance are gained because forced draft fans are considerably smaller.
- — casings for forced draft fans are cool — require no insulation — contribute to safer operation and cooler boiler rooms.

Forced draft is one of many reasons why you get a greater return from your investment in a Cleaver-Brooks boiler — a boiler of foremost quality in every detail and with many immediate and long-range cost-saving features. Cleaver-Brooks self-contained boilers are available for oil, gas, combination oil and gas firing — 15 to 500 hp., 15 to 250 lb. p.s.i.

CLEAVER-BROOKS COMPANY
356 E. Keefe Ave., Milwaukee 12, Wis.

Write for a Cleaver-Brooks Steam Boiler Catalog



. . . With the new Cleaver-Brooks Rotary Burner

(Continued from page 78)

Incorporating many improvements, this new cleaner weighs only 15 lb and is only 13 in. long. It provides increased capacity, too, from ⅜ up to 2½ or even 3 in. OD tubes, company states, and operates on air pressure as low as 50 lb. Hollow shafting is available in one piece up to 20 ft, or in sectional threaded lengths. Thomas C. Wilson, Inc., 21-11 44th Ave., Long Island City 1, N. Y.

CONVEYOR DRIVE UNITS

For assembling custom built conveyor systems from stock units

Handidrive Units make it possible to build a complete conveyor system, permitting flexibility in design. A single conveyor, or a complete flow system, can be assembled with the various units. Belt, live roller and roller gravity conveyors come in five standard widths from 10½ to 26½ in. between channel side rails. Standard Conveyor Co., North St. Paul 9, Minn.

CIRCUIT PROTECTOR

12-circuit capacity, features magnetic action in each breaker

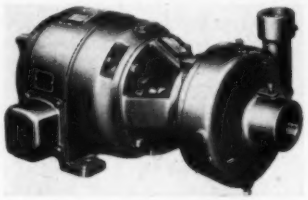
This 12-circuit unit is a new addition to manufacturer's line which includes 2- 6- and 8-circuit protectors. The magnetic action makes it impossible for the breakers to trip due to external or internal heat, company explains, and the breakers need no "derating." The standard package of the 12-circuit protector consists of four 15-amp breakers plus two 20-amp breakers with provision for six additional breakers. Six pairs of handle extensions are supplied.

No main switch is required ahead of the "12" and "8" units, providing the number of operating handles is limited to six by the use of handle extensions. Individual breakers are interchangeable with other new single pole individually housed breakers. Murray Mfg. Corp., 1250 Atlantic Ave., Brooklyn 16, N. Y.

SMALL CENTRIFUGAL PUMP

Is easily serviced, all wetted parts of Type 316 stainless steel

The Series 1522 Stainless Steel Pump is suggested for use in the chemical, process, and food industries, and is constructed in ¾ to 1½ in. discharge and



from ¼ hp, 1750 rpm to 2 hp 3450 rpm. It features a leak-proof mechanical Teflon seal, standard motor, hydraulically balanced impeller and spring-type flexible coupling. The Bell & Gossett Co., Morton Grove, Ill.

LARGE AREA SWEEPER

For use with Ford tractor, is made with steel or fibre brushes

This attachment sweeps a 5 ft swath at a 30 deg angle depositing debris outside of tractor wheels. The broom is driven by rear power take-off at a fixed ratio to engine speed to provide efficient sweeping at all tractor speeds. Shafts are heavy duty type and turn on ball bearings; finger tip power hydraulic control raises the broom. Moving parts are protected and there's a full length dust hood. Meili-Blumberg Corp., New Holstein, Wis.

TEMPERATURE CONTROLLER

Is rugged and highly sensitive electronic device

This controller is suggested for use with heated molds, immersion heaters, liquid baths, ovens, furnaces and other applications where close control of critical temperatures over long periods is desired. A direct dial setting instrument, it is designed to maintain preselected temperature within 0.50 C sensitivity from any point within its range, and to handle loads to 3000 w capacity operating from a standard outlet of 115 v 60 cycle current fused to carry necessary load.

The unit is described as positive and free from draft, double fused and "fail safe" in the event of failure of components or thermocouple. It has twin plug-in receptacles for hook-up of devices or to solenoid or other temperature controls. A stainless steel single thermocouple actuates unit when connected to heating device. Phen-Trols, Inc., 15 Franklin Pl., Rutherford, N. J.

Pitt Chem Protective Coatings guard your equipment with a tough, surface-protecting film . . . an impervious sheath against strong chemicals, high temperatures, atmospheric exposure and other destructive elements of industrial corrosion and contamination. *Pitt Chem* Coatings are completely uniform and dependable because they are laboratory-controlled from raw materials to finished product. You'll find the cost of safeguarding your equipment with *Pitt Chem* is surprisingly low. ● For more information, write for new booklet, "Control Corrosion Through Pitt Chem Protective Coatings."

★ Hot Applied Tar Base Coatings ★ Cold Applied Tar Base Coatings ★ Alkyd Base Coatings
★ Chlorinated Rubber Base Coatings ★ Vinyl Base Coatings ★ Phenolic Base Coatings

Protective Coatings Division

PITTSBURGH COKE & CHEMICAL CO.

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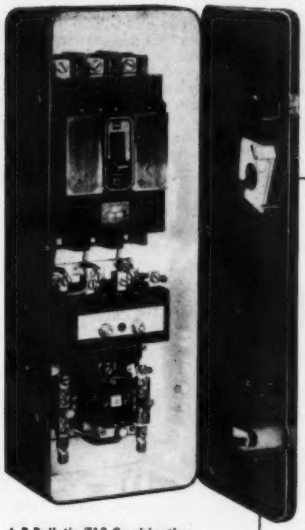
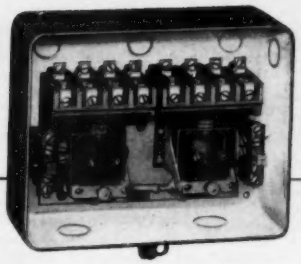
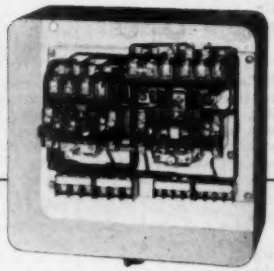


A-B Bulletin 713 Combination Starter with circuit breaker.

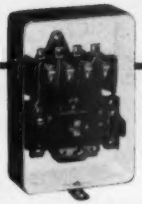


A-B Bulletin 705 Automatic Reversing Switch. Note the white interior.

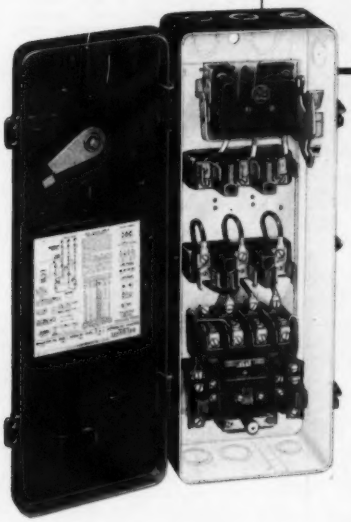


A-B Bulletin 715 Automatic Multi-Speed Starter. Easy to install.

A Complete Line of *Quality* Motor Starters



A-B Bulletin 709 Size 1 Solenoid Starter.



A-B Bulletin 712 A-C Combination Starter with fuse clips.

Easy to Install: Ample wiring space, accessible terminals, and white interiors make all Allen-Bradley starters so easy to install, even in dark locations.

Neat Appearance: The spic and span cabinets have simple lines that harmonize with any installation. Finished in baked black enamel with a bonderized undercoating. The gleaming white interiors reflect light even in dark locations.

Maintenance Free: No other starters are so simple . . . and hence so trouble free. Only one moving part. Once sold, A-B starters easily establish their quality reputation—a fact of value to you in the development of your business.

Universal Acceptance: Nationally advertised . . . acclaimed everywhere for quality, design, and performance . . . preferred by plant engineers . . . Allen-Bradley control is easily sold by electrical contractors for every type of installation. Send for catalog, today.

Allen-Bradley Co., 1317 S. First St., Milwaukee 4, Wis.

A-B Quality

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

LIQUID BLENDER

Is automatic proportioning system for two or more liquids

No charts or calculations are used to set this blender for any combination of liquids, according to manufacturer, and simple controls on each meter permit setting of ingredient proportions in increments to meet plant needs. Total throughput is recorded on master counter and each ingredient recorded separately on its own meter. The master counter is available with predetermining device and/or ticket printer, and meters come with counters or ticket-printers.

Blender is designed so that failure of any ingredient supply automatically shuts off systems, and if the supply to any meter is slowed down, all meters synchronize to the same rate. Measurement is by volumetric displacement. If the number of ingredients is reduced at any time, one or more meters may be made inoperable. A dust-resistant cabinet encloses the blender and dials and gages are visible from the outside. Bowser, Inc., Fort Wayne, Ind.

SHEET GRIPPERS

For holding sheet metal parts; are inexpensive, fast working

Avdel Grippers are designed to operate without use of springs or special tools and draw sheet metal parts together closely. They are said to remain firmly in place in oversized holes, and to work well in blind applications. According to company, the extra grip length of shank permits holding several sheets together at one time, and the surface area at contact points is large and smooth to prevent damage to metal surfaces. Grippers come in 3/32, 1/8, 5/32 and 3/16 in. hole sizes. Aviation Developments, Inc., 210 N. Front St., Burbank, Cal.

PLUG-IN STRIP

Offers more safety, convenience of electrical receptacles

The CF2-G Grounding "Plug-in" Strip is announced as providing a wiring system that is completely grounded, thus reducing fire and casualty hazards. It also carries a convenient spread of

electric receptacles, every one grounded to the steel channel of the strip.

Although this plug-in strip has received a Lewis & Conger Home Safety Award it is also recommended for industrial installations. It is made of 24-gage steel and wired with No. 12 AWG copper wire conductors. Receptacles are extra-heavy bakelite and spaced every 6 or 18 in. Connections are made with copper-barrel connectors, crimped on the conductors. Strip comes in 6 ft lengths in neutral satin gray finish. National Electric Products Corp., Chamber of Commerce Bldg., Pittsburgh 19, Pa.

No doubt about it! One vital question you must be ready to answer on short notice is this—"Will *your* plant be ready to produce at peak capacity and efficiency, in the event of an 'all-out' emergency?"

To make sure you answer YES when the question arises, put "ZIG-ZAG" to work for you *right now!* Patented "ZIG-ZAG" Continuous Power Conveyors, an exclusive engineering achievement of Richards-Wilcox, are at work in every line of industry throughout the nation, breaking production line bottle necks, reducing materials-handling problems and costs, and conserving on manpower. As hundreds of plant-owners can testify, *only* "ZIG-ZAG" solves the handling problem so quickly and effectively.

"Zig-Zag" Adaptable to any size plant

There is practically no limitation to the purposes for which the "ZIG-ZAG" Conveyor system can be used for handling materials in industry. It is adaptable to almost every plant condition or layout, and is the last word in flexibility.

Pays for Itself

R-W "ZIG-ZAG" Continuous Power Conveyors effect such substantial savings in manpower and money, the equipment quickly pays for itself—usually in less than one year! So, regardless of the size of your plant, or the nature of your production problem, find out how "ZIG-ZAG" can help *you* be ready . . . "when the time comes."

For complete details, or a prompt engineering consultation without any obligation, write our nearest office today.

1880 1951
Reg. U. S. Pat. Off.
OVER 71 YEARS

Richards-Wilcox Mfg. Co.
"A MANGER FOR ANY DOOR THAT SLIDES"
AURORA, ILLINOIS, U.S.A. Branches in all principal cities
SLIDING DOOR HANGERS & TRACKS • FIRE DOORS & SHUTTERS • GARAGE DOORS & EQUIPMENT
INDUSTRIAL CONVEYORS & CRANES • SCHOOL MARKERBOARDS & PARTITIONS
ELEVATOR DOOR OPERATING EQUIPMENT

AUTOMATIC DEGASSER

Has mild steel case, treated to minimize corrosion

The re-designed Degasser is described as easy to disassemble. The interior mechanism is more accessible and the structural members of the case strengthened. Intended primarily for use in determination of steam purity, this unit is designed to produce continuously and automatically an approximately 50-50 split of a flowing steam sample; one fraction contains any dissolved solids that may be present, the other any dissolved gases. Hagan Corp., Hagan Building, Pittsburgh 22, Pa.

HIGH SPEED RECORDER

For measuring rapidly changing variables in test applications

Full-scale signals which vary as rapidly as 20 cycles a minute can be recorded on this new electronic pen recorder, company states, also those with peak-to-peak amplitude of 10 per cent of scale which vary as rapidly as three cycles a second. It is suggested for analyzing fuel efficiencies and engine designs, and for spectrographic and other analyses where relatively high scanning rates and narrow increments of change are encountered in a measured variable. Brown Instruments Div., Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia, Pa.

"Tycol Acylkup runs bearings cooler... slashes repair costs... steps up production"

A fact! Tycol Acylkup Grease is an expertly blended calcium soap and specially selected cylinder oil stock combination that assures long bearing life . . . less down time loss . . . lower maintenance costs . . . lower output cost per pound of grease. It is available in a number of penetration ranges to permit application indoors or out— under all weather conditions.

Ask your nearest Tide Water Associated office for complete information. Call today.

TYCOL

INDUSTRIAL LUBRICANTS

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Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco

TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE - NEW YORK 4, N. Y.

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SHEET FEEDING TABLE

In two capacities, has scissors type lifting mechanism

When handling bundles of square or nearly square steel sheets the load is concentrated in a small area while the

height of the bundle is greater than for large sheets. This makes it desirable to have a sheet feeding table of short length with maximum range of elevation. In the new Hydraulic Sheet Feeding Table the over-all top length is only 66 in. but the table elevates from an 18-in. lowered position to 36-in. elevated position. This construction also gives more rigid support for off center loads.

Offered in capacities for 6000 and 10,000 lb, the table is portable, having 6-in. swivel casters at steering end and 10 in. rear wheels. Hydraulic rams raise the table. Power is supplied by a foot-operated or motor driven hydraulic pump, or a motor driven hydraulic pumping unit, available with push button or pedal controls. Lyon-Raymond Corp., 43-81 Madison St., Greene, N. Y.

ALUMINUM HOSE

For marine and barge loading, is lightweight and easily handled

Besides the substantial saving in weight, this aluminum hose offers several other advantages. Manufacturer points out that it is unaffected by severe temperatures and climatic conditions, and it will handle products injurious to other types of hose. It's engineered for easy handling and quick connections — company reports that connections can be made by one man in less than 10 min—and when not in service the hose is swung back to the mast without requiring disconnection from dock riser.

This hose is announced as not subject to kinking, crushing or cutting and swivel joints make possible short bends, resulting in a substantial shortening of the length of hose required. Turning or flexing movement is handled by double rows of steel balls in steel races which are inserted in the aluminum body of the swivel joint. Besides its marine uses, this aluminum hose is also suggested as a transfer line for manifold installations where speed, contamination and economy are factors. Chiksan Co., Brea, Cal.

HOSE CLAMP

Is self-tightening, self-adjusting to temperature changes

To install this ring-type clamp, you simply squeeze the ends with pliers, slip the clamp over the connection and release. The clamp is designed to exert uniform pressure at every circum-

ference point, allowing for irregularities in hose or pipe up to 1/16 in. Clamp is shaped from rounded stock so as not to cut the hose. It is easily disconnected and may be re-used. Clamp comes in sizes to fit connections from 3/8 through 2 5/8 in. O.D., and is for use with rubber, fabric or plastic hose conveying air, gases or liquids. Corbin Hose Clamp Div., The American Hardware Corp., New Britain, Conn.

PORTABLE TRUCK SCALE

Can be moved to job easily, readied for use without adjustments

To move this scale it's necessary only to remove the six nuts holding the side arms in place. The rest of the scale is lifted as a unit. Large rugged steel bases support the scale and no pits or concrete footings are required.

The scale can be truck loaded with a light crane, special front-end eyes are provided for winch loading. Standard capacities are 18, 20 and 30 t, deck lengths from 18 to 30 ft. Weighbeam is chrome plated, other vital parts heavily electro-plated to prevent rust and corrosion. The Thurman Machine Co., Columbus, O.

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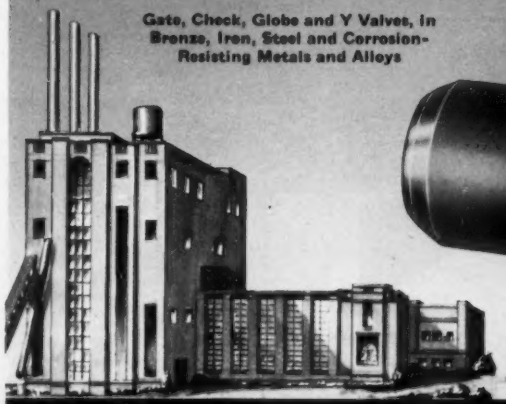

Fig. 11303 W.E. Class 1500-pound Cast Steel Pressure Seal Gate Valve with welding ends. One of many Powell designs for Power Plants.

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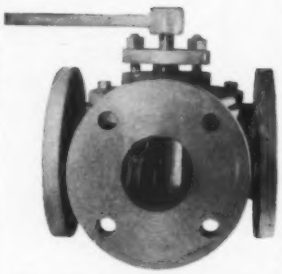

THE HONEYWELL transfer valve is a simple, compact valve designed for diverting flow from one line to another—such as cooling water from one condenser to another or oil from one strainer to another. It replaces two conventional valves and fittings. Operates by movement of single lever . . . no chance of opening or closing both lines simultaneously.

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MINNEAPOLIS-HONEYWELL REGULATOR COMPANY, *Industrial Division,* 1914 Windrim Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

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Flintcrust Liquid is intended to convert a "naked" concrete or cement-compounded floor into one capable of long and maintenance-free service under oil, grease, discoloring and disintegrating conditions. Manufacturer says it counteracts and prevents "sanding" and eventual surface breakdown, and prevents drag of handling equipment. Approximate coverage of this hardener is ⅞ gal per 100 sq ft; it is available in 6-, 12-, 18-, 30- and 50-gal containers. Flexrock Co., Filbert and Cuthbert, W. of 36th St., Philadelphia 4, Pa.

SERVICE KITS

For repair, conversion work on pressure regulators, lubricators

Besides providing the next best thing to new equipment these service kits are intended to reduce time and expense of repair work for users of this manufacturer's equipment, and to facilitate conversion to meet changing production requirements. In all, 20 kits are available. Fourteen repair kits are offered for use with four types of regulators and with company's oil fog lubricators. Six kits are for converting conventional pressure regulators to air-relieving and liquid pressure types.

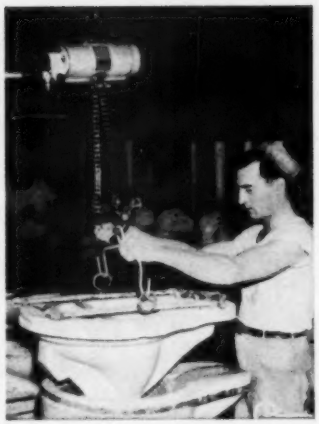
The kits contain from four to 11 new parts and include illustrated instructions. When repair work is necessitated by a part failure manufacturer recommends that all new parts in the kit be installed at the time to prevent possible failure of other worn parts. C. A. Norgren Co., 222 Santa Fe Drive, Denver 9, Col.

DRAWING BOARD

Made of clear plastic, is light in weight, easy to use

The Graphostat Precision Board consists of a single piece of molded Bakelite styrene plastic. No thumb tacks are needed for attaching 8½ by 11 in. paper because there are

four corner clamps, recessed so triangle or roller can roll over them. Metal straight edges are retractable, and 30-, 45-, and 60-deg triangles can be clamped in place underneath. Board is 9¾ by 12¼ in., costs $3.95. Bakelite Co., Union Carbide and Carbon Corp., 122 E. 42nd St., New York 17, N. Y.



Keller Hoist lifts fragile wet ceramic unit out of its mold

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*for 1000-lb Hoist. Capacities of 300 and 2000 lb are also available.

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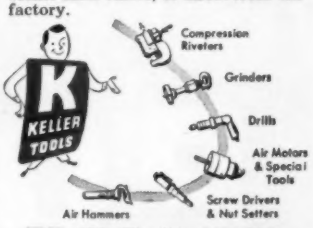
Keeps air hose conveniently suspended, permitting it to follow a trolley-suspended Keller Air Hoist.

Keller Air Hoists, Hoist Trolleys, and Hose Trolleys are available through Keller sales offices, or direct from the factory.



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NEW BOOKS

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Machine Shop Practice

METAL PROCESSING, by Orlan William Boston. Second edition; size 6 by 9 in.; 763 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $7.50.

THIS SECOND edition has been revamped to bring it up to date and to provide detailed information on machine processes, accessories and tools. It gives the information needed for the complete preparation of the process routings including the selection of machine tools, the cutting tool materials, tool shapes, power, speeds, feeds and all accessories involved in plant layout for manufacture.

The book correlates the design of the part, the metal of which it is made, the fabricated form, and the machines and tools used in its manufacture. It has been revised to focus attention on new developments, information has been added on electric motors, hydraulic pumps, machine tool drives, sintered carbide tools and their use and machinability and a new chapter on surface quality has been included.

The many illustrations of basic and special machine tools, typical machining operations and comprehensive recommended practices should be of use to production, tool and design engineers.

Data on Feedback Control

SERVOMECHANISMS AND REGULATING SYSTEM DESIGN by Harold Chestnut and Robert W. Mayer. Size 6 by 9 in.; 505 pp including index; illustrated; cloth bound. Published by John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $7.75.

THIS IS THE first of two volumes on feedback control. The book starts from the basic mathematics, describes clearly the nature of the physical problems involved, and proceeds to the solution of advanced designs.

A listing of several of the chapter headings will give some idea of the material covered: the automatic control problem, solution of linear differential equations, methods of determining system stability, types of servomechanisms and control systems, attenuation concepts for use in feedback control system design, and multiple-loop and multiple-input feedback control systems.

Volume 2, scheduled for later publication, will deal with such problems as the means of establishing design specifications as well as

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Industrial Management Guide

PRINCIPLES OF INDUSTRIAL MANAGEMENT, by L. P. Alford and H. Russell Beatty. Revised edition; size 6 by 9 in.; 759 pp; illustrated; cloth bound. Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. Price $6.00.

THIS REVISED edition prepared by H. Russell Beatty incorporates the many developments which occurred in the past decade. Special attention is given to the many changes in concepts and practices of industrial management which developed out of World War II and in the years immediately following. The book features a more quantitative and factual treatment of methods, techniques and practices of management, as contrasted with the qualitative or descriptive approach.

Some of the chapters which will be of direct interest to plant engineers are: control of stores-keeping, motion and time study, material and labor costs, overhead, maintenance of buildings and machinery, and industrial safety.

The textbook meets the needs of those people in industry who seek a comprehensive treatment of the principles and methods used in the management of an industrial enterprise.

Steel Products Manual

HERE ARE TWO manuals to add to the Steel Products Manual series: a new section and a revised section. The new manual is Section 30, issued in March 1951, covering Carbon Spring Steel Flat Wire, 64 pp, 6 by 9 in., paper bound. The revised manual is Section 17, on Low Carbon Steel Flat Wire, 54 pp, 6 by 9 in., paper bound. The manuals are available from American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y. Price 25 cents each.

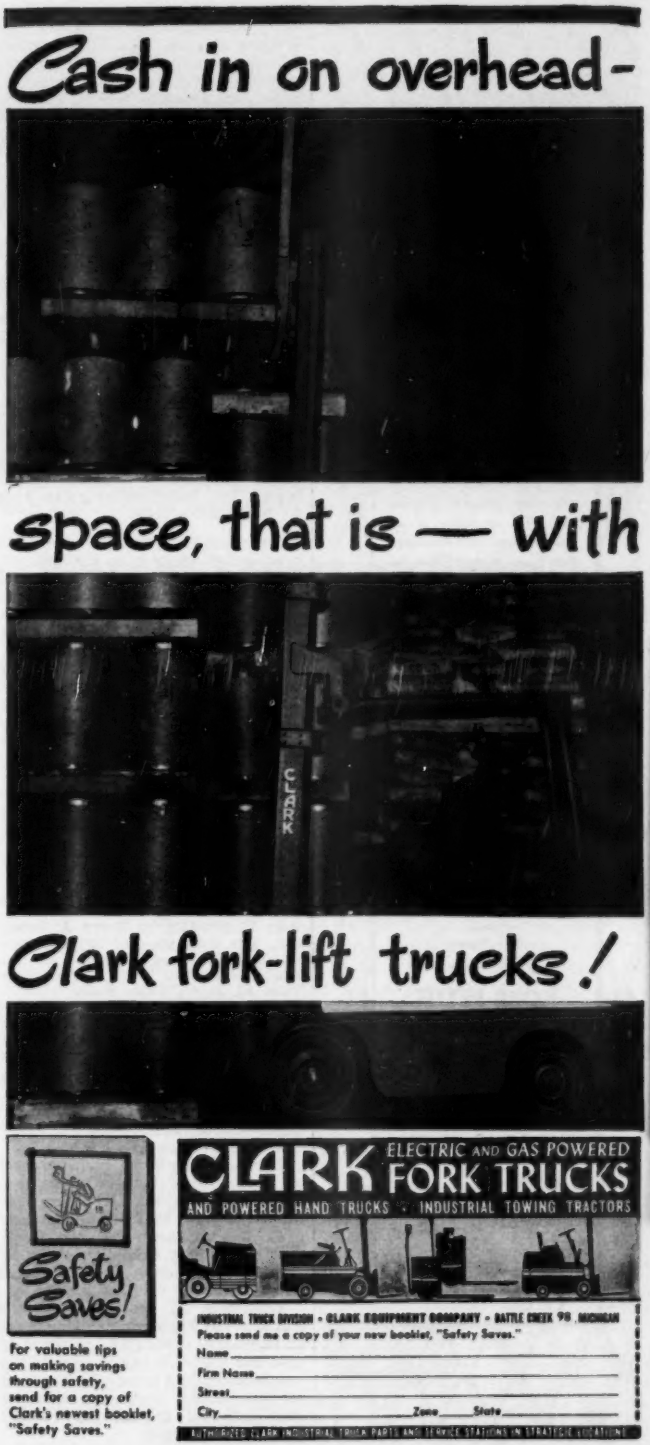
Each of the manuals is treated in five parts which cover metallurgical aspects, manufacturing practices, quality requirements, chemical requirements and packaging, marketing and loading methods.

Data for Chemical Engineers

CHEMICAL ENGINEERS' HANDBOOK. Edited by John H. Perry. Third edition; 1942 pp including index; illustrated; flexible leatherette binding. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price $15.00.

THIS THIRD edition has been revised and expanded to keep you abreast of information on the theory and practice of chemical engineering.

Following are some of the sec-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tions which have been revised, rewritten or expanded: heat transmission; cooling towers; distillation; movement and storage of materials; and high pressure technique. The following sections have been added in this edition: general theory of diffusional operations; furnaces and kilns; size enlargement; azeotropic distillation; multi-component distillation; extractive distillation; molecular distillation; and dialysis.

Everyone in the chemical engineering profession, and all whose work in industry or engineering touches on this field, will find this handbook a source of principles, data standards and practices in all branches of chemical engineering.

All About Electroplating

ELECTROPLATING by J. B. Mohler and H. J. Sedusky. Size 5½ by 8¾ in.; 257 pp including index; cloth bound. Published by Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. Price $5.00.

THE BOOK DISCUSSES the aspects of practical electroplating without going into the involved details of electrochemical theory. The fundamentals, such as batch voltage, polarization and current distribution, are discussed in simple language.

The characteristics of plating baths, behavior of electric current during plating, the deposit, composition of common plating baths, control methods and analytical procedures are well covered. Special chapters are devoted to alloy plating, continuous plating, diffusion coatings, copper plating for selective carburization and to commercial applications.

Info on Gas Turbines

GAS TURBINES by Harry A. Sorensen. Size 6 by 9¼ in.; 431 pp; illustrated; cloth bound. Published by The Ronald Press Co., 15 E. 26th St., New York 10, N. Y. Price $6.50.

THIS TEXTBOOK covers thermodynamic principles, elements of design, and general construction features of the gas turbine. It treats the gas turbine as a power plant which can, through modifications in design and construction, be applied to many classes of service.

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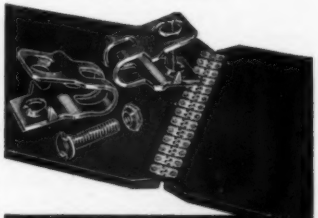

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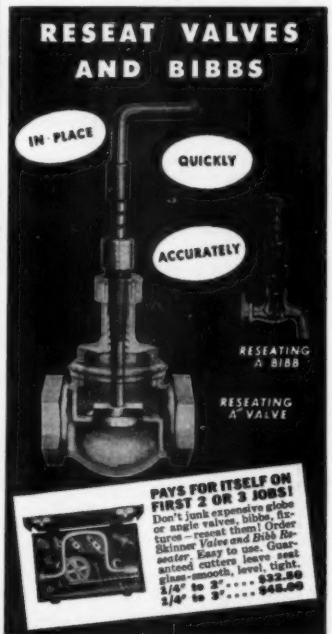

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DATA FILE

of literature for the plant library

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MATERIALS HANDLING

201 For Efficient Overhead Handling — Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. The American MonoRail Co.

203 Manual on Electric Hoists — Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls; gives dimensions. American Engineering Co.

204 Handbook on Overhead Conveying Systems — Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering and application data. Richards-Wilcox Mfg. Co.

206 Portable Hoists — This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions, operating advantages. Keller Tool Co.

207 Fastenings for Conveyor Belts — This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.

208 What's New in Mechanized Handling —Vol. 1, No. 1 of Material Handling News, a house organ, is a report on company's new handling equipment. Among subjects covered in the 28-pp illustrated booklet are the Dynatork Drive, which transmits engine power to the drive-axle by magnetic induction. Industrial Truck Div., Clark Equipment Co.

209 Data on Tramrail Equipment — Twelve-pp Form 2008F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

210 Conveying Systems Manual — Unloading and conveying of dry pulverized material are discussed in 24-pp Bulletin FK-25. Text covers system and operation; stationary pump, accessories. Fuller Co.

212 Conveyor and Elevator Belts—This 26-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.

215 All-Around Bulk Handler — Catalog Supplement 8065, 16 pp, describes the Dumpster, a truck-mounted carrying and dumping unit which does the work of several trucks by means of interchangeable containers. Shows how different containers handle a wide range of bulk materials, solids, liquids. Dempster Bros.

217 Metal Conveyor Belts — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both con-

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ventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Includes photos, data on weaving limits, weight, mesh openings, take up for wire conveyor belts. Wickwire Spencer Steel Div., The Colorado Fuel and Iron Corp.

218 Data on Truck Casters — As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

219 Hydraulic Jacks—Hand, wheeled and gage-equipped jacks from 1½-t capacity models to 100-t capacity extra-heavy duty jacks are covered in Catalog J-50, 16 pp. Illustrated, includes specifications, selection information. Explains construction features. Blackhawk Mfg. Co.

220 Sheet Lifters — Operational and design features of company's sheet lifting equipment which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Photos show sheet lifters in use. Cullen-Friestedt Co.

221 For Easier Loading—Full information on adjustable loading docks which speed up freight handling and "mechanize" loading operations is given in this bulletin. Rowe Methods, Inc.

ELECTRICAL, LIGHTING

224 Motor Handbook — Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.

225 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution system, gives construction, engineering, application data. The Trumbull Electric Mfg. Co.

226 Precision Switches—Twenty-pp Catalog 81 covers industrial switches for a-c circuits. Describes general purpose basic switches, auxiliary actuators, enclosed, explosion-proof and splash-proof types, limit switches, small switches. Includes technical data, prices. Micro Switch.

227 Electric Motor Lubrication Studies—Bulletin 1579 shows comparative amounts of lubricant in different designs of bearings, how bearings are subject to air circulation. Explains company's Lubriflush principle. U. S. Electrical Motors, Inc.

228 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also strap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

229 Selector Switch Data — This folder of engineering information includes target sheet to aid in understanding company's push-pull selector switch. Features explanation on how switch provides single master control serving up to 16 operations. The Arrow-Hart & Hegeman Electric Co.

230 Distribution Duct Engineering Data —Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating, diagrams, layout symbols. BullDog Electric Products Co.

231 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Includes specifications, mounting data. Feedrail Corp.

233 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.

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234 Centralizing Motor Control — Illustrated Bulletin B-4213, 28 pp, presents modern control centers which feature flexibility, increased safety and operating efficiency and easier installation and maintenance. Shows how flexibility is gained both in starter unit and in later additions. Mechanical features, wiring and maintenance, safety discussed. Industrial Control Div., Westinghouse Electric Corp.

235 Weatherized Motors—Six-pp Bulletin 400 describes company's All-Weather integral motors for industrial use. These have full height protection, through ventilation, one-piece steel shell, interchangeability of end head. Robbins & Myers, Inc.

236 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Gives standard reel sizes and capacities, standard specifications. Rome Cable Corp.

237 Retractile Cords—Bulletin KKG describes and pictures some of the applications for permanently colled, neoprene jacketed electric cords which expand to 5 times retracted length. Kolled Kords, Inc.

238 Fluorescent Lighting Equipment — Bulletin mf provides 20 pp of information specifications and mounting data on lighting equipment for Slimline fluorescent lamps. Covers individual units, accessories, continuous line systems, suspension fittings. Benjamin Electric Mfg. Co.

239 Selection Data on Lighting Fixture Hangers—Catalog 50, 80 pp contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Sectionalized for easy reference, utilizes over 247 photos and drawings to show construction principles, operating features, typical installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

VENTILATING, AIR CONDITIONING, DUST CONTROL

240 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited

in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

241 Weatherproof Power Exhausters — Featured in this 8-pp bulletin are direct-drive exhausters so designed that the motor is out of the line of air flow to avoid damage by moisture and corrosive fumes. Includes recommended average air changes, air velocities required for exhaust hoods, rating table, specifications, uses. The Gallaher Co.

242 Dust Collectors — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk and Blum Mfg. Co.

243 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

246 Dust Precipitators—Twelve-pp Bulletin 1728 covers manufacturer's latest design of dust precipitators, a line designed to handle fly ash, cinders and industrial dusts, to meet the need for a compact, simple, economical all-purpose mechanical type unit. Includes performance and efficiency curves. American Blower Corp.

249 Dust Recovery — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency. Buell Engineering Co., Inc.

250 Dust Control Technology — Detailed selection, operation, and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Discusses control of air movements, recommended hood and enclosure design, exhaust air velocity and volume and rules for installing system piping. Pangborn Corp.

PIPING, VALVES, TRAPS AND FITTINGS

251 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercially available sizes of steel pipe. Tube Turns, Inc.

252 Piping Pointers—This is a new 36-pp edition of company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

253 Piping Layout Manual — Practical Piping Layouts 26-50 is a 36-pp collection of basic piping layouts, with valve recommendations, covering a wide range of industrial setups — an automatic sprinkler system tank connection, oil burner piping for light oils, central pumping station for transfer of fluids. Jenkins Bros.

254 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculations, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

255 How to Choose and Use Air Traps—Bulletin 202 describes air trap selection and installation for automatic drainage of moisture from compressed air intercoolers, aftercoolers, receivers, separators and drip points. Armstrong Machine Works.

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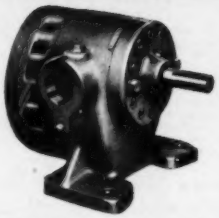

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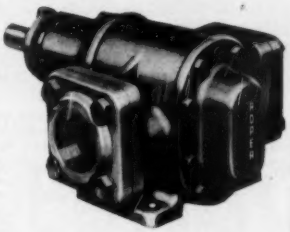

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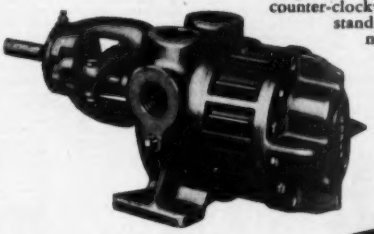

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256 Steam, Air, and Gasoline Traps — Illustrated Catalog 250 describes several types of thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, piston-operated steam traps, also steam, air and gas separators. Includes capacity tables, installation diagrams. W. H. Nicholson & Co.

257 Strainers and Separators — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, prices. American District Steam Co.

259 Unions and Fittings — Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees and fittings. Describes special construction features. E. M. Dart Mfg. Co.

262 Safety Head Catalog — Section 10, Part 1 of Catalog 54, 52 pp, contains charts and tables covering almost any phase of safety head information. Tells where safety heads can be used and how to use them. Gives advantages of manufacturer's line in protecting pressure equipment. Tells how to choose safety head assemblies and rupture discs. Includes tips on lowering temperature at point of safety head location. Black, Sivalls & Bryson, Inc.

263 Solving Steam Trap Problems—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.

264 Expansion Joints — Bullet'n EJ-1912 is a revised 12-pp edition of booklet covering both gun-packed and gland-packed expansion joints. Fully illustrated, cites advantages of both types, discusses construction details, servicing. Includes dimensions, prices. Yarnall-Waring Co.

265 To Stop Those Leaks—Catalog 41-0 offers 28 pp of helpful ordering and application data on pipe repair clamps and saddles, valve and bibb reseaters. Illustrates each product, tells where to use it and how to install it, giving dimensions and prices. M. B. Skinner Co.

FUELS, LUBRICATION

266 Viscosity of Fluids—The larger significance of viscosity is discussed in Nos. 5 and 6, Vol. 36 of Lubrication, a technical publication. Illustrates simplest conception of streamline flow between two surfaces having relative motion. Shows how viscosity is measured. The Texas Co.

267 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricant requirements of equipment in 25 major industries. Lubriplate Div., Fiske Brothers Refining Co.

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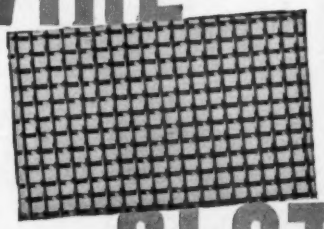

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268 The Why, What and How of Lubricants — This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.

269 Lubrication of Air Compressors—Technical Bulletin B-2 is a 40-pp text on air compressors and pneumatic tools. Written in non-technical language and clearly illustrated, it explains the principle of air compression, and tells how it is put to use. Discusses lubrication of compressors, touching upon lubrication systems, choice of oils and good maintenance procedure. Lubrication recommendations for pneumatic tools are included. Sun Oil Co.

MECHANICAL POWER TRANSMISSION

274 Longer Life for Bearings — Bulletin 57B describes an economical three-step metallizing process which provides hard, oil holding surfaces for new and worn bearings. Metallizing Engineering Co., Inc.

275 Manual on Power Transmission Machinery—Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering, selection, ordering information; includes formulas. Dodge Mfg. Corp.

276 Power Drive Handbook — Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

277 Handbook on Chains and Sprockets — An excellent reference book in 216-pp Catalog A418. Discusses various chains and their service applications, metals used in them, and factors affecting their efficiency. Gives selection information on chains for drives and for elevators and conveyors. Engineering data includes dimensions, strengths, weights. The Jeffrey Mfg. Co.

280 Manual on V-Belt Drives — Catalog 280 is pocket-sized, but contains 384 pp of illustrations, tables and other technical information to make it possible to select V-belts for any power transmission drive quickly and accurately. List prices, dimensions included, also a 12-pp supplement on cog belt drives. The Dayton Rubber Co.

PUMPS, PUMPING

282 Centrifugal Pump Care — Sixteen-pp Bulletin 08X6256A is a handbook on the care of all makes of centrifugal pumps. Tells how to figure head, determine friction loss. Discusses causes of troubles and their cures, includes maintenance time table. Tells how to prevent cavitation, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.

284 How to Solve Pumping Problems—Form 3060 is a 130-pp manual on selection, use of pumps. Tells type of pump construction best suited for handling 150 liquids. Explains how to determine size, compute suction list and discharge head, determine direction of rotation and size of speed of pulleys or gears. Gives instructions for installing rotary pumps, locating trouble. Geo. D. Roper Corp.

286 Rotary Pumps—The operating principle, advantages, construction features and range of applications of standard, heavy duty and special rotary pumps are explained in illustrated Bulletin 51-S, 8 pp. Includes dimensions. Viking Pump Co.

MAINTENANCE

290 Drip Preventive Handbook — Insulation of pipelines, tanks, cold air conditioning ducts and wall surfaces against corrosion and condensation drip is covered in pocket-size 32-pp Form F-17. Describes coatings, tells how to apply. Includes coverage tables. J. W. Mortell Co.

292 Iron Cement Handbook — This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

293 Building Maintenance — Handbook 7, offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

294 Before Your Next Paint Job—Catalog F5136 offers plant engineers many a helpful hint on points to be considered before undertaking a paint job. Illustrated, covers principles of contrast control and how to apply them. The Tremco Mfg. Co.

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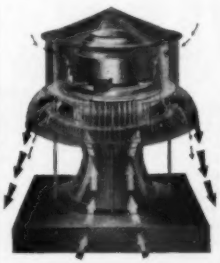

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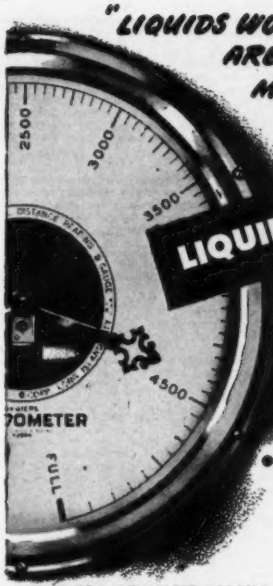

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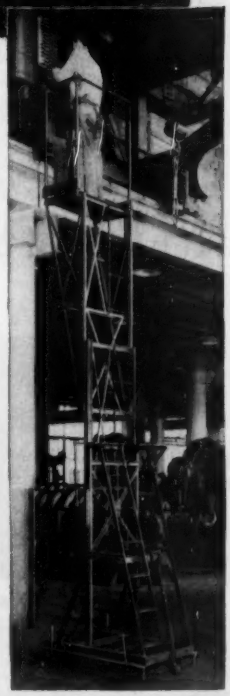

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295 Protective Coatings — This bulletin offers concise information on Glisonite- and mica-based coatings for protecting heavy industrial equipment against corrosion, and sealing walls. Includes selection table covering more than 25 coatings. Insul-Mastic Corp. of America.

296 Power Brushes—Bulletin C-269, describing company's new line of power brushes, contains photos showing their design and use. The Osborn Mfg. Co.

297 What's Your Corrosion Problem? — This small folder on rust preventives for protection of metal surfaces presents both the oil film and petrolatum types, telling how each is used, giving recommended uses. Gulf Oil Corp., Gulf Refining Co.

298 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.

CONSTRUCTION

300 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.

301 Building Panel Engineering Data — This 40-pp reference book on use of steel and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Fenestra Building Products Co.

302 Glass Block and Where to Use It—This 32-pp book gives design data, information on functional and decorative aspects of glass block. Covers properties, specifications, erection procedures. Insulux Div., American Structural Products Co.

303 Technical Data on Plexiglas — This is a file folder of information on Plexiglas sheets, rods, molding powders, covering workability, properties, thicknesses. Discusses large area lighting. Rohm & Haas Co.

304 Building Construction and Maintenance Manual—Here's a 112-pp illustrated manual packed with facts on concrete and wood floor treatments, paints, protective coatings, concrete and mortar admixtures, waterproofing and dampproofing, caulking compounds, and roof coatings. Indexed, estimating guides on floor treatments and roof coatings, brick requirements, timber requirements and watercement ratios. L. Sonneborn Sons, Inc.

305 Technical Manual on Plywood—Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

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308 Industrial Control Devices — Catalog 8303, 64 pp, presents 100 models of non-indicating electric, electronic, and pneumatic controllers for flow, pressure liquid level and humidity applications. New instruments shown, include electronic temperature controllers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

309 Time Saving Volt-Ammeter—Manual 110, 18 pp, "How to Make Your Job Easier with the Amprobe," describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing electrical equipment. Pyramid Instrument Corp.

311 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature, pressure, low water, liquid level, boilers; transformer-relays, control valves, mercury switches. The Mercoid Corp.

312 Water Temperature Control—How to regulate cooling water system of diesel and gasoline engines and air compressors with company's water temperature control is explained in this bulletin. The Powers Regulator Co.

313 Electrical Instruments — A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters, matched a-c and d-c portable instruments, also current transformers, light meters. Weston Electrical Instrument Corp.

PACKINGS, SEALS

315 Data on Packings — Form 428 is a collection of bulletins on flexible metallic packing, semi-metallic packing, rotary mechanical seal, oil pressure system and steel packing tools. Durametallic Corp.

317 Mechanical Seals for Rotary Shafts —Illustrated with cutaway drawings, this 12-pp booklet covers seals of the positive, chevron, and o-ring types, giving specifications. The Garlock Packing Co.

HEATING

322 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, includes plumbing fixtures. J. A. Sexauer Mfg. Co., Inc.

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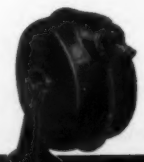

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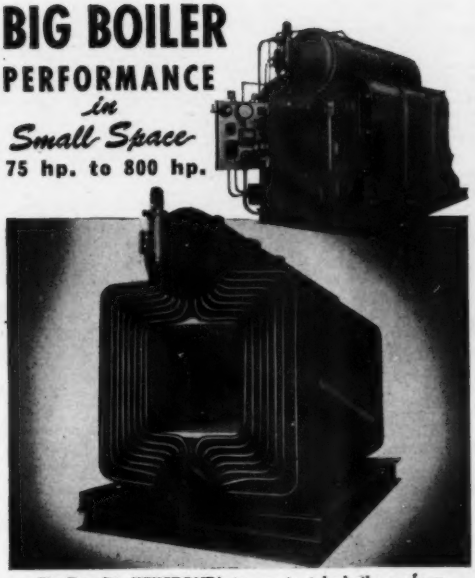

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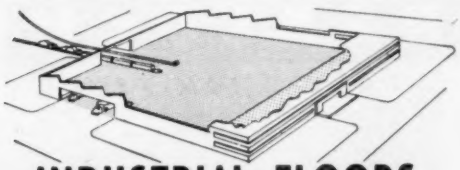

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TOOLS

328 Pipe Tool Operating Guide — Form O.G. is a concise 4-pp folder prepared to help users get best results from portable pipe and bolt machines and hand pipe tools. Tells quickly how to locate and correct pipe machine and hand pipe tools troubles. In all, 31 operations are covered. Beaver Pipe Tools, Inc.

329 Tool Catalog — Hand and power tools, tool sets, kits and related equipment are presented in 110-pp Catalog T. Includes descriptive, ordering and application data. Snap-On Tools Corp.

330 Pipe Tool Ordering Guide—Newly-published Catalog, 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs, and wrenches, giving dimensions, selection information. Includes price list. Armstrong Bros. Tool Co.

OTHER EQUIPMENT

331 Vacuum Blasting — The efficiency and economy of vacuum blasting equipment for cleaning of equipment and other maintenance jobs, weld preparation, and conveying of granular material, is presented in this bulletin. A flow chart illustrates operation. Vacu-Blast Co., Inc.

332 Wire Cloth and Screen—This 48-pp handbook offers valuable help in selecting and ordering industrial wire cloth and woven wire screens. It's illustrated with photos showing wire sizes, spacing, weaves and crimps and types of openings. It discusses applications of different types, and metals used. Includes weights of copper, brass and iron wire per 1,000 ft. Korb-Pettit Wire Fabrics and Iron Works, Inc.

333 Steel Cabinet Benches—Construction features of steel benches are covered in 8-pp Bulletin 702. Six models are illustrated with dimensions and available top materials given. Standard Pressed Steel Co.

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342 For Conductometric Determination of Solids—A quick and simple method for determining solids content of boiler water or condensate is explained and illustrated in Bulletin 2RE50. Hall Laboratories, Inc.

343 Four Handy Guides for Plant Engineers—Bulletin 20B6051J, 12 pp, offers data on figuring V-belt drives; Bulletin 51B-6025K, 12 pp, for quick selection of electric motors; Bulletin 52B6059E, 16 pp, for selection of centrifugal pumps, and Bulletin 25B6051B, for power generation, distribution and control equipment. Specify booklets wanted. Allis-Chalmers Mfg. Co.

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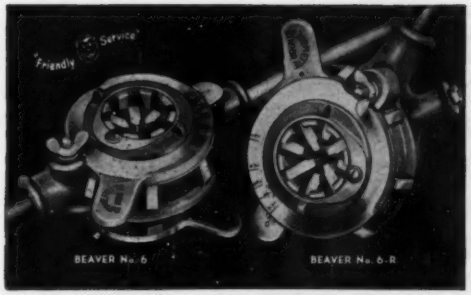

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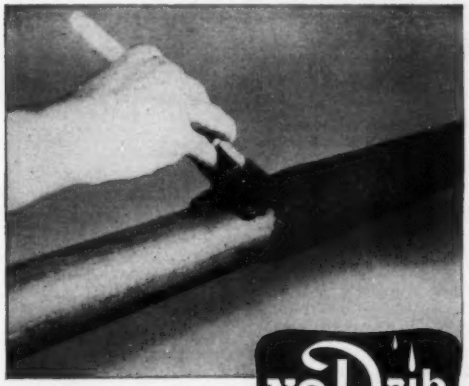

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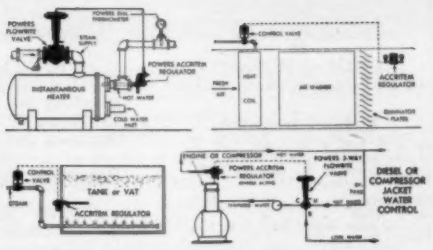

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'ROUND ABOUT

with the editors

(Continued from page 4)

Chicago: On June 8 the Chicago Club, now officially the Plant Engineers' Society of Chicago, met for the last time before the summer vacation period. TED RAMOND, chairman, distributed copies of the constitution and by-laws adopted at the May meeting. DICK MORRIS spoke briefly on his recent trip to England and will give a more complete report of the plant engineers' conference and English plant engineering practices at the first fall meeting in September. In October DON BROWN will discuss maintenance organization and practices at the Corn Products Refining Co., and in November Ted Ramond of the Goodman Manufacturing Co. will talk on roofs—types, construction and care.

Philadelphia: At the June 1st meeting, the Philadelphia Plant Engineers Club had their election of officers for the coming year. The new officers for the club will be: JAMES R. CLEMENS, of Link Belt Co., president; ROBERT F. McCAW, RCA-Victor Div., vice-president; C. E. STINER, Rohm & Haas Co., secretary-treasurer. The board members for the coming year will be James J. MacDonald, John M. Waligora and David J. Godschall.

Personnel Notes

FRANK MODJESKA was appointed Department Superintendent of Maintenance of the Hawley Shop of Allis-Chalmers Mfg. Co. at Milwaukee, Wis., succeeding EDWARD KLOPFLEISCH, who is now Works Manager of their Boston Works. Mr. Modjeska will be in direct charge of all functions of the Maintenance Division which includes tool design, toolroom, millwright and machine repair departments.

NEIL J. BRASKI has been appointed Plant Engineer at the Painesville, Ohio, plant of Diamond Alkali Co. JACK R. HORACEK, who has been Manager of Utilities at their plant in Houston, Tex., was named to succeed him in his former position as superintendent of the power department.

Scholarships Offered at M. I. T.

To HELP ENGINEERS meet problems of human relations that are often encountered in their work, particularly in foreign countries, Harry A. Kuljian, noted Philadelphia engineer and head of the Kuljian Corp, has established two scholarships for seniors at the Massachusetts Institute of Technology.

These scholarships are intended to help promising engineering students to round out their education in world affairs, traditions, economics, and the humanities. The scholarships, valued at $500 each, are to be awarded to two seniors whose records indicate exceptional promise.

The creation of the new School of Humanities and Social Studies at M.I.T. encouraged Mr. Kuljian to establish these scholarships. Candidates will be nominated by Dean Burchard of the new school. The purpose of the scholarships is to assist the winners to broaden their education in the field of the humanities and social studies, in order that they may gain a better understanding of human relations in applying their technical training.

Personnel Changes at RCA

R. F. McCAW has been appointed Assistant to the General Plant Manager of Radio Corp. of America, RCA Victor Division, Camden, N. J. In this capacity he will coordinate Plant Engineering activities in conjunction with mobilization planning throughout the Engineering Products Department.

F. O. ZIEGLER has been appointed plant engineer of the Engineering Products Department, at the Camden Plant of Radio Corp. of America.

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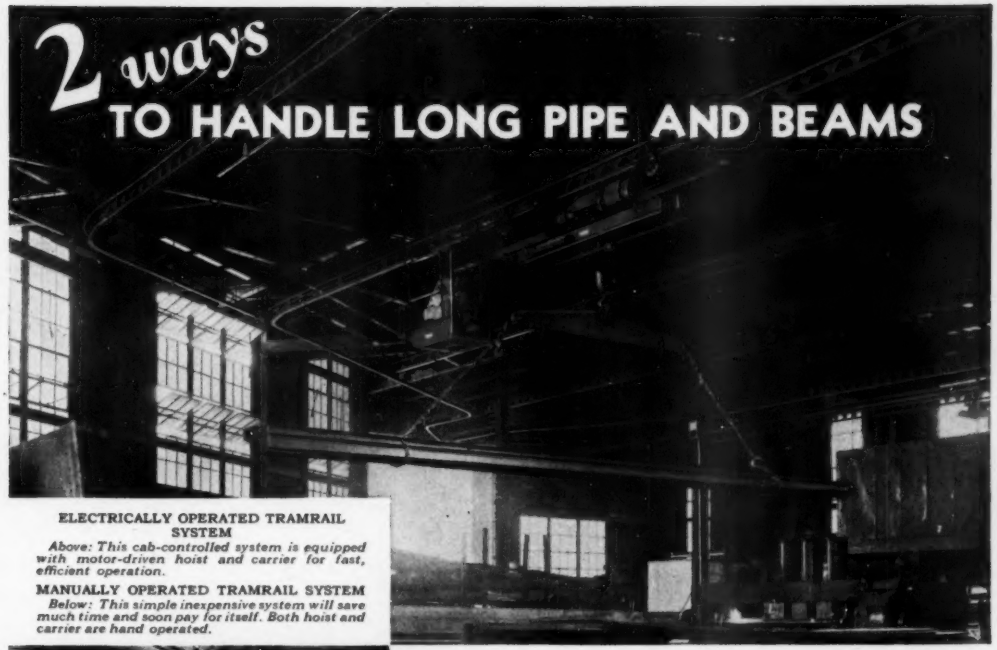
2 ways TO HANDLE LONG PIPE AND BEAMS



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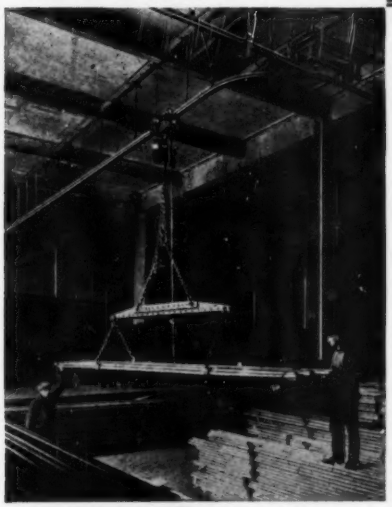
Above: This cab-controlled system is equipped with motor-driven hoist and carrier for fast, efficient operation.

MANUALLY OPERATED TRAMRAIL SYSTEM

Below: This simple inexpensive system will save much time and soon pay for itself. Both hoist and carrier are hand operated.



Long pipe, beams and metal stock are heavy and awkward to handle by hand or on floor conveyances. It is difficult to haul them through narrow shop aisles and around corners. In many instances it is necessary to reload onto different types of conveyances in order to overcome floor obstacles and reach the ultimate delivery point.

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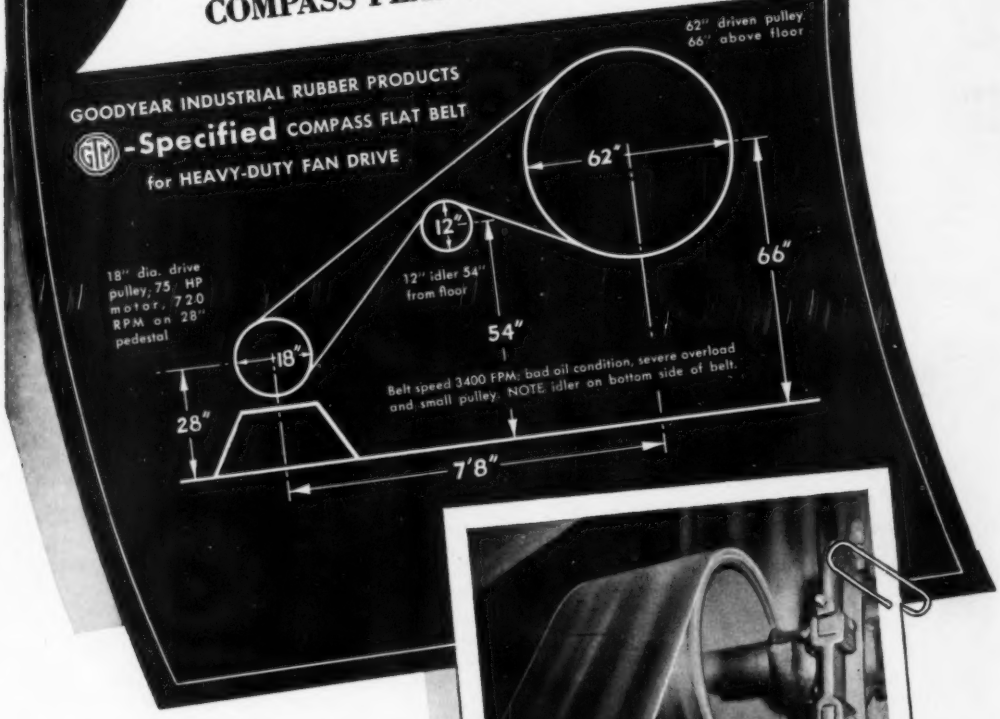
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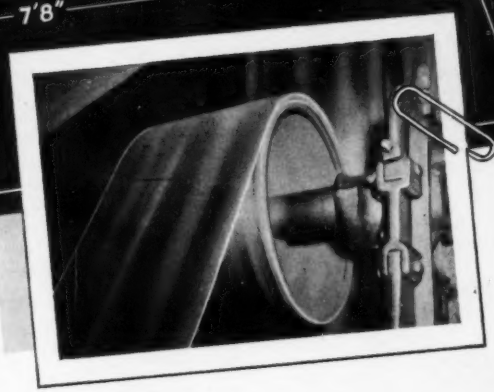
66" above floor
62"
12"
66"
18" dia. drive pulley, 75 HP motor, 720 RPM on 28" pedestal
12" idler 54" from floor
54"
18"
28"
Belt speed 3400 FPM; bad oil condition, severe overload and small pulley. NOTE idler on bottom side of belt.
7'8"



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